B.E. CIVIL ENGINEERING(REGULAR)
COURSE OFSTUDYANDSCHEME OFEXAMINATIONS (2017andOnwards)
SEMESTERI

SUB. CODE	TITLE OFTHECOURSE	Sub. Area	PEO	PO	L	T	P	C	CIA	ESE	TOTAL	Contact Hours /week
THEORY												
17BECC101	English for Engineers	HS	1	10	3	0	0	3	40	60	100	3
17BECC102	EngineeringMathematics I	BS	1	1	3	2	0	4	40	60	100	5
17BEPH103 17BECH103	EngineeringPhysics/ EngineeringChemistry	BS	1,2	3	3	0	0	3	40	60	100	3
17BECE104	Basic CivilEngineering	ES	1	1	3	0	0	3	40	60	100	3
17BECE105A 17BECE105B	Basic ElectricalandElectronics Engineering/ Elements of Mechanical Engineering	ES	1	1	3	0	0	3	40	60	100	3
PRACTICAL												
17BEPH111 17BECH111	EngineeringPhysicsLaboratory/ EngineeringChemistryLaborator	BS	1,2	3	0	0	4	2	40	60	100	4
17BECE112	EngineeringGraphics	ES	1	1	1	0	3	3	40	60	100	4
17BECE113	ComputerPractice and ProgrammingLab	ES	1	2	1	0	4	3	40	60	100	5
TOTAL								**24**	**320**	**480**	**800**	**30**
VALUE ADDED COURSE												
17BECC151	YOGA	MC	1	12	1	0	0	-	100	0	100	1
TOTAL CONTACTHOURS/WEEK												31

SEMESTERII

SUB. CODE	TITLE OFTHECOURSE	Sub. Area	PEO	PO	L	T	P	C	CIA	ESE	TOTAL	Contact Hours
THEORY												
17BECC201A 17BECC201B	BusinessCommunication/ TechnicalEnglish	HS	1	10	3	0	0	3	40	60	100	3
17BECC202	EngineeringMathematicsII	BS	1	11	3	2	0	4	40	60	100	5
17BEPH203/ 17BECH203	EngineeringPhysics/ EngineeringChemistry	BS	1,2	3	3	0	0	3	40	60	100	3
17BECC204	EnvironmentalSciences	HS	3	7,12	3	0	0	3	40	60	100	3
17BECE205A 17BECE205B	Basic ElectricalandElectronics Engineering/ Elements of Mechanical Engineering	ES	1	1	3	0	0	3	40	60	100	3
PRACTICAL												
17BEPH211/ 17BECH211	EngineeringPhysicsLaboratory/ EngineeringChemistry Laboratory	BS	1	1	0	0	4	2	40	60	100	4
17BECE212	EngineeringWorkshopPractice	ES	1	1	0	0	4	2	40	60	100	4
17BECE213	BuildingPlanningand Drawing Laboratory-CADD	PC	1	4,5	0	0	3	2	40	60	100	3
TOTAL								**22**	**320**	**480**	**800**	**28**
VALUE ADDED COURSE												
17BECC251	BusinessPlan	MC	3	11	1	0	0	-	100*	0	100	1
TOTAL CONTACTHOURS/WEEK												**29**

SEMESTERIII

SUB. CODE	TITLE OFTHECOURSE	Sub Area	PEO	PO	L	T	P	C	CIA	ESE	TOTAL	Contact Hours /week
THEORY												
17BECE301	Methods ofApplied Mathematics	BS	1	1	3	2	0	4	40	60	100	5
17BECE302A 17BECE302B	ConstructionMaterials, Equipments and Geology**(SC)**/Concrete	PC	1,2	2	3	0	0	3	40	60	100	3
17BECE303	EngineeringMechanics	ES	1	1	3	0	0	3	40	60	100	3
17BECE304	TransportationEngineering**(SC)**	PC	1,2	2,	3	0	0	3	40	60	100	3
17BECE305	Mechanicsoffluids	ES	1	3	3	0	0	3	40	60	100	3
17BECE306	Surveying I**(HC)**	PC	1	6	3	0	0	3	40	60	100	3
PRACTICAL												
17BECE311	ConstructionMaterialsLaboratory &Oriented Projects**(HC)**	PC	1,2	4,9	0	0	3	2	40	60	100	3
17BECE312	SurveyingPracticalI**(HC)**	PC	1	6	0	0	3	2	40	60	100	3
TOTAL								**23**	**320**	**480**	**800**	**26**
VALUE ADDED COURSE												
17BECE351	SoftSkills	MC	10	1	2	0	0	-	100*	0	100	2
TOTAL CONTACTHOURS/WEEK												**28**

SEMESTER IV

SUB. CODE	TITLE OFTHECOURSE	Sub. Area	PEO	PO	L	T	P	C	CIA	ESE	TOTAL	Contact Hours /week
THEORY												
17BECE401A 17BECE401B	ConstructionMaterials, Equipments and Geology**(SC)**/Concrete Technology**(SC)**	PC	1	2	3	0	0	3	40	60	100	3
17BECE402	SolidMechanics I	ES	1	3	3	0	0	3	40	60	100	3
17BECE403	Applied Hydraulics andMachinery	ES	1,	7	3	0	0	3	40	60	100	3
17BECE404	Mechanics ofSoil**(HC)**	PC	1	3	3	0	0	3	40	60	100	3
17BECE405	Surveying II**(HC)**	PC	1	6	3	0	0	3	40	60	100	3
PRACTICAL												
17BECE411	GeotechnicalLaboratory**(HC)**	PC	1,	7	0	0	3	2	40	60	100	3
17BECE412	SurveyingPracticalII**(HC)**	PC	1	6	0	0	3	2	40	60	100	3
17BECE413	Scientific ComputingLaboratory	PC	1	1	2	0	2	3	40	60	100	4
TOTAL								**22**	**320**	**480**	**800**	**25**
VALUE ADDED COURSE												
17BECE451	CourseOriented Project-I	MC	2	2	0	0	0	-	100*	0	100	-
TOTAL CONTACTHOURS/WEEK												**25**

SEMESTER V

SUB. CODE	TITLE OFTHECOURSE	Sub. Area	PEO	PO	L	T	P	C	CIA	ESE	TOTAL	Contact Hours /week
THEORY												
17BECE501	Structural Analysis I**(HC)**	PC	1	2,	3	2	0	4	40	60	100	5
17BECE502	Design ofRCStructuresI**(HC)**	PC	1	2,	3	2	0	4	40	60	100	5
17BECE503	SolidMechanicsII	ES	1	3	3	0	0	3	40	60	100	3
17BECE504	EnvironmentalEngineeringI**(SC)**	PC	1,	6	3	0	0	3	40	60	100	3
17BECE505A 17BECE505B	WaterResourcesEngineering **(SC)**/BuildingServices**(SC)**	PC	1,3	6	3	0	0	3	40	60	100	3
17BECE5E--	ProfessionalElectiveI	PE	1	3	3	0	0	3	40	60	100	3
PRACTICAL												
17BECE511	StrengthofMaterials Laboratory **(HC)**	PC	1,2	4,9	0	0	3	2	40	60	100	3
17BECE512	Applied Hydraulics and Hydraulic MachineryLaboratory**(HC)**	PC	1,3	7	0	0	3	2	40	60	100	3
TOTAL								**24**	**320**	**480**	**800**	**28**
VALUE ADDED COURSE												
17BECE551	CourseOriented Project-II	MC	2	2	0	0	0	-	100*	0	100	-
TOTAL CONTACTHOURS/WEEK												**28**

SEMESTER VI

SUB. CODE	TITLE OFTHECOURSE	Sub. Area	PEO	PO	L	T	P	C	CIA	ESE	TOTAL	Contact Hours /week
THEORY												
17BECE601	Structural Analysis II**(HC)**	PC	1	2,	3	2	0	4	40	60	100	5
17BECE602	Design ofRCStructuresII**(HC)**	PC	1	2,	3	2	0	4	40	60	100	5
17BECE603	EnvironmentalEngineering II**(SC)**	PC	1	3	3	0	0	3	40	60	100	3
17BECE604	Design ofSteelStructures**(HC)**	PC	1	2,	3	2	0	4	40	60	100	5
17BECE6E--	ProfessionalElectiveII	PE	1	3	3	0	0	3	40	60	100	3
17BECE6E--	ProfessionalElectiveIII	PE	1	3	3	0	0	3	40	60	100	3
PRACTICAL												
17BECE611	Concrete and HighwayLaboratory **(HC)**	PC	1,2	2,3	0	0	3	2	40	60	100	3
17BECE612	EnvironmentalEngineering Laboratory**(HC)**	PC	1	3	0	0	3	2	40	60	100	3
TOTAL								**25**	**420**	**480**	**800**	**30**
VALUE ADDED COURSE												
17BECE651	Irrigation and Environmental EngineeringDrawing	MC	1	3	0	0	3	-	100*	0	100	3
TOTAL CONTACTHOURS/WEEK												**33**

SEMESTER VII

SUB. CODE	TITLE OFTHECOURSE	Sub. Area	PEO	PO	L	T	P	C	CIA	ESE	TOTAL	Contact Hours /week
THEORY												
17BECC701	ProfessionalEthics, Principlesof Managementand Entrepreneurship Development	HS	3	8	3	0	0	3	40	60	100	3
17BECE702A 17BECE702B	WaterResourcesEngineering(SC)/ BuildingServices(SC)	PC	1,3	6	3	0	0	3	40	60	100	3
17BECE7E--	ProfessionalElectiveIV	PE	1	3	3	0	0	3	40	60	100	3
	Open ElectiveI	OE	1	6,	3	0	0	3	40	60	100	3
	Open ElectiveII	OE	1	6,	3	0	0	3	40	60	100	3
PRACTICAL												
17BECE711	Estimation, QuantitySurveyingand Valuation(HC)	PC	1	11	2	0	2	3	40	60	100	4
17BECE712	StructuralDetailingandDrawing Laboratory-CADD **(HC)**	PC	1	11	0	0	3	2	40	60	100	3
17BECE791	Project Work-PhaseI	PW		4,	0	0	8	4	40	60	100	8
TOTAL								**24**	**320**	**480**	**800**	**30**
VALUE ADDED COURSE												
17BECE751	CourseOriented Project-III	MC	2	3	0	0	3	-	40	60	100	3
TOTAL CONTACTHOURS/WEEK												**33**

SEMESTER VIII

SUB. CODE	TITLE OFTHECOURSE	Sub. Area	PEO	PO	L	T	P	C	CIA	ESE	TOTAL	Contact Hours /week
THEORY												
17BECE8E--	ProfessionalElectiveV	PE	1	6	3	0	0	3	40	60	100	3
17BECE8E--	ProfessionalElectiveVI	PE	1	6	3	0	0	3	40	60	100	3
PRACTICAL												
17BECE891	Project Work -&Viva voce	PW		4,	0	0	32	16	120	180	300	32
TOTAL								**22**	**200**	**300**	**500**	**38**
TOTAL CONTACTHOURS/WEEK												**38**

***To be evaluated internally by a committee of members**

Final report+(certificate if necessary) – 50marks

Final presentation and viva voce – 50marks

Total number ofcredits:186

L:LectureHour T:TutorialHour CIA: Continuous Internal Assessment

P:Practical Hour C: Credit ESE: End semester Examination

LIST OF ELECTIVES

PROFESSIONAL ELECTIVES (PE)

SUB. CODE	TITLE OFTHEPAPER	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
17BECEE001	Hydrology	1,2	2,4,7,15	3	0	0	3	40	60	100
17BECEE002	Cartography	1,2	5,6,9	3	0	0	3	40	60	100
17BECEE003	Composite Materials and Structures	1,2	5,6	3	0	0	3	40	60	100
17BECEE004	Ground Water Engineering	1,2	2,3,7	3	0	0	3	40	60	100
17BECEE005	Irrigation Engineering	1,2	7,9,11	3	0	0	3	40	60	100
17BECEE006	Foundation Engineering	1,2	2,3,4	3	0	0	3	40	60	100
17BECEE007	Urban WaterResources management	1,2	5,7,9	3	0	0	3	40	60	100
17BECEE008	Ground ImprovementTechniques	1,2	2,3,4	3	0	0	3	40	60	100
17BECEE009	Prefabricated Structures	1,2	1,9,12,15	3	0	0	3	40	60	100
17BECEE010	SoilPollution Engineering	1,2	2,3,4	3	0	0	3	40	60	100
17BECEE011	Railways, Airportsand Harbours	1,2	1,3,4,5,14	3	0	0	3	40	60	100
17BECEE012	RepairandRehabilitationofStructures	1,2	1,9,12,15	3	0	0	3	40	60	100
17BECEE013	MunicipalSolidWaste Management	1,2	4,7,11,14	3	0	0	3	40	60	100
17BECEE014	AirPollutionManagement	1,2	3,4,5,7	3	0	0	3	40	60	100
17BECEE015	Pre-stressed ConcreteStructures	1,2	1,9,12,15	3	0	0	3	40	60	100
17BECEE016	SmartStructuresandSmartMaterials	1,2	5,9,6	3	0	0	3	40	60	100
17BECEE017	Finite ElementTechniques	1,2	1,2, 5,9,6	3	0	0	3	40	60	100
17BECEE018	GeographicalInformationSystem (GIS)	1,2	5,9,6	3	0	0	3	40	60	100
17BECEE019	Introduction to SoilDynamicsand Machine Foundations	1,2	2,3,4	3	0	0	3	40	60	100
17BECEE020	IndustrialStructures	1,2	1,9,12,15	3	0	0	3	40	60	100
17BECEE021	EnvironmentalImpactAssessmentof WaterResourcesDevelopment	1,2	4,7,11,14	3	0	0	3	40	60	100
17BECEE022	Construction ResourcePlanningand Management	1,2	1,9,12,15	3	0	0	3	40	60	100
17BECEE023	Traffic EngineeringandManagement	1,2	1,3,4,5,14	3	0	0	3	40	60	100
17BECEE024	Remote SensingTechniquesand Applications	1,2	5,9,6	3	0	0	3	40	60	100
17BECEE025	IndustrialWasteManagement	1,2	4,7,11,14	3	0	0	3	40	60	100
17BECEE026	TallBuildings	1,2	1,9,12,15	3	0	0	3	40	60	100
17BECEE027	Design ofBridge Structures	1,2	1,9,12,15	3	0	0	3	40	60	100
17BECEE028	Seismic Design ofReinforced Concrete Structures	1,2	1,2,5,9,6	3	0	0	3	40	60	100
17BECEE029	HighwayEngineering	1,2	1,3,4,5,14	3	0	0	3	40	60	100
17BECEE030	Housing, PlanandManagement	1,2	5,9,6	3	0	0	3	40	60	100
17BECEE031	AdvancedConstructionTechnology	1,2	3,4,5,7	3	0	0	3	40	60	100
17BECEE032	Design ofShellandSpatialStructures	1,2	1,9,12,15	3	0	0	3	40	60	100
17BECEE033	Geoinformatics in CivilEngineering	1,2	2,3,4	3	0	0	3	40	60	100
17BECEE034	WaterSupplyDistributionandBuried Pipelines	1,2	4,7,11,14	3	0	0	3	40	60	100

17BECEE035	RiverEngineering	1,2	1,3,4,5,14	3	0	0	3	40	60	100
17BECEE036	PavementEngineering	1,2	1,3,4,5,14	3	0	0	3	40	60	100
17BECEE037	QualityControland Safety Management	1,2	3,4,5,7	3	0	0	3	40	60	100
17BECEE038	Shoring,Scaffoldingand	1,2	1,9,12,15	3	0	0	3	40	60	100
17BECEE039	Town PlanningandArchitecture	1,2	1,9,12,15	3	0	0	3	40	60	100
17BECEE040	Geo EnvironmentalEngineering	1,2	2,3,4	3	0	0	3	40	60	100

OPEN ELECTIVES
COURSES OFFERED BY OTHER DEPARTMENTS

SUB. CODE	TITLE OFTHEPAPER	PE0	PO	L	T	P	C	CIA	ESE	TOTAL
SCIENCE ANDHUMANITIES										
17BESHOE01	Probability and Random Process	1	1	3	0	0	3	40	60	100
17BESHOE02	Fuzzy Mathematics	1	1	3	0	0	3	40	60	100
17BESHOE03	Linear Algebra	1	1	3	0	0	3	40	60	100
17BESHOE04	Engineering Acoustics	1,2	1,2	3	0	0	3	40	60	100
17BESHOE05	Solid Waste Management	1,2	7,11,14	3	0	0	3	40	60	100
17BESHOE06	Green Chemistry	1,2	1,3,5	3	0	0	3	40	60	100
17BESHOE07	Applied Electrochemistry	1,2	1,3,5	3	0	0	3	40	60	100
17BESHOE08	Industrial Chemistry	1,2	1,3,5,	3	0	0	3	40	60	100
17BESHOE09	English for Technocrats	1	9,10,12	1	4	0	3	40	60	100
COMPUTERSCIENCE ENGINEERING										
17BECSOE01	Internet Programming	1,2	1,3	3	0	0	3	40	60	100
17BECSOE02	Multimedia AndAnimation	2	1,3	3	0	0	3	40	60	100
17BECSOE03	Pc Hardware And Trouble Shooting	2	5,6	3	0	0	3	40	60	100
17BECSOE04	Java Programming	1,2	1,3	3	0	0	3	40	60	100
ELECTRICAL&ELECTRONICS ENGINEERING										
17BEEEOE01	Electric Hybrid Vehicle	1,2	1,5	3	0	0	3	40	60	100
17BEEEOE02	Energy Management & Energy Auditing	1,2	1,6,7	3	0	0	3	40	60	100
17BEEEOE03	Programmable Logic Controller	1	1,4	3	0	0	3	40	60	100
17BEEEOE04	Renewable Energy Resources	1,2	1,6,7	3	0	0	3	40	60	100
ELECTRONICS COMMUNICATION ENGINEERING										
17BEECOE01	Real Time Embedded Systems	1,2	1,2,	3	0	0	3	40	60	100
17BEECOE02	Consumer Electronics	1	1	3	0	0	3	40	60	100
17BEECOE03	Neural Networks and its Applications	1,2	1,5	3	0	0	3	40	60	100
17BEECOE04	Fuzzy Logic and its Applications	1	1,5	3	0	0	3	40	60	100
BIOTECHNOLOGY										
17BTBTOE01	Bioreactor Design	1,2	1,3,6	3	0	0	3	40	60	100
17BTBTOE02	Food Processing and Preservation	1	1	3	0	0	3	40	60	100
17BTBTOE03	Basic Bioinformatics	1	1	3	0	0	3	40	60	100
17BTBTOE04	Fundamentals of Nano Biotechnology	1,2	1	3	0	0	3	40	60	100
MECHANICAL ENGINEERING										
17BEMEOE01	Computer Aided Design	1,2	1,3,4,6	3	0	0	3	40	60	100
17BEMEOE02	Industrial Safety and Environment	1,2	1,3,12	3	0	0	3	40	60	100
17BEMEOE03	Transport Phenomena	1,2	1,3,5	3	0	0	3	40	60	100
17BEMEOE04	Introduction to Biomechanics	1	1,2	3	0	0	3	40	60	100
AUTOMOBILE ENGINEERING										
17BEAEOE01	Automobile Engineering	1	1,2	3	0	0	3	40	60	100
17BEAEOE02	Basics of Two AndThree Wheelers	1	1,5	3	0	0	3	40	60	100

17BEAEOE03	Automobile Maintenance	1	1,12	3	0	0	3	40	60	100
17BEAEOE04	Introduction to Modern Vehicle Technology	1	1,12	3	0	0	3	40	60	100

COURSES OFFERED TO OTHER DEPARTMENT

SUB. CODE	TITLE OFTHEPAPER	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
17BECEOE01	Housing, Planand Management	1,2	5,9,6	3	0	0	3	40	60	100
17BECEOE02	Building Services	1,2	8	3	0	0	3	40	60	100
17BECEOE03	Management of irrigation systems	1,2	7,9,11	3	0	0	3	40	60	100
17BECEOE04	Advanced construction technology	1,2	3,4,5,7	3	0	0	3	40	60	100

Total number of credits:186

L:LectureHour **T:TutorialHour** **CIA: Continuous Internal Assessment**

P:PracticalHour **C:Credit** **ESE: End semesterExamination**

Note:

1.The passing minimum for value added course is 50 marks out of100marks.There will be two tests, of which one will be class test covering 50% of syllabus for 50 marks and other for 50 marks.

2. Credits for value added course are not counted for computation of CGPA.

3. Interested students can opt two self studycoursein seventh semester from open electives which will be reflected in the marksheet.

**-- Skill Development
**-- Employability
**--Entrepreneurship

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

PO-1Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO-2 Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO-3 Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO-4 Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO-5 Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO-6 The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO-7 Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO-8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO-9 Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO-10Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write

effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO-11 Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12 Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSO)

The B.E. Degree Programme in Civil Engineering is offered in the department with the following programme specific outcomes:

PSO-13 The Graduates of this Programme with proficiency in mathematics and physical sciences will excel in the core areas of civil engineering such as structural, environmental and water resources engineering.

PSO-14 Utilize principles, methods, software's and codes of practices to excel in the areas of planning, analysis and designs related to Civil Engineering systems.

PSO-15 Prepare detailed drawings, cost estimates, reports, walk through views, interact with clients, manage workers, work in a team and executes construction works.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The Civil Engineering education at KAHE, Coimbatore, mainly based on practical oriented learning. The courses offered are focused on training the students to make them adaptable to any type of role in different fields of Civil Engineering.

The B.E. Degree Programme in Civil Engineering is offered in the department with the following educational objectives:

PEO-1 To equip the graduates with sufficient knowledge and experience to become leaders in industry and academia

PEO-2 To offer platform for research and development

PEO-3 To impart professional ethics with a commitment to the society and environment

PEO-PO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1	✓	✓	✓		✓			✓	✓		✓	✓
PEO2	✓	✓		✓	✓		✓		✓	✓	✓	✓
PEO3			✓		✓	✓	✓	✓		✓	✓	✓

PEO-PSO mapping

	PSO1	PSO2	PSO3
PEO1	✓	✓	✓
PEO2	✓	✓	✓
PEO3		✓	✓

SEMESTER I&II

SEMESTER I& II

17BECC101 ENGLISH FOR ENGINEERS 3 0 0 3 100

OBJECTIVES:

1. To enable students to attain fluency and accuracy to inculcate proficiency in professional communication to meet the growing demand in the field of Global communication.
2. To help students acquire their ability to speak effectively in real life situations.
3. To inculcate the habit of reading and to develop their effective reading skills.
4. To ensure that students use dictionary to improve their active and passive vocabulary.
5. To enable students to improve their lexical, grammatical and communicative competence.
6. To improve the student's communication skill at interview level.

COURSE OUTCOMES:

1. To use English language for communication: verbal & non-verbal.
2. To enrich comprehension and acquisition of speaking & writing ability.
3. To inculcate the habit of reading and to develop their effective reading skills.
4. To hone their listening, speaking, Reading and writing skills.
5. To gain confidence in using English language in real life situations.
6. To improve word power: lexical, grammatical and communication competence.

Unit- I LSRW SKILLS & GRAMMAR

Receptive Skills (Listening, Reading and Scanning) & Productive Skills (Writing, Speaking and Representing) (9)

Listening–Types of listening- Listening to class reading - Video tapes/ Audio tapes. **Speaking** – Introduction on self. **Reading** - Reading for comprehension – Reading different kind of passages like descriptive, narrative, objective, conversational and argumentative.**Writing** – Formal and Informal letters- Letters to the Editor.

Grammar&Vocabulary (Function Grammar & Technical Vocabulary)

Parts of Speech -Tenses -Articles. **Vocabulary** - Word Formation – Word expansion (Root word) - Prefix and Suffix.

Unit – II LSRW SKILLS & GRAMMAR

Receptive Skills (Listening, Reading and Scanning) & Productive Skills (Writing, Speaking and Representing) (8)

Listening – Understanding the passage in English –Pronunciation practice. **Speaking** – Asking and answering questions. **Reading** – Critical reading – Finding key information in a given text (Skimming - Scanning). **Writing**– Coherence and cohesion in writing – Short paragraph writing – Writing short messages.

Grammar&Vocabulary (Function Grammar & Technical Vocabulary)

WH questions –Yes/No Question - Subject Verb agreement. **Vocabulary**– Compound Nouns/Adjectives – Irregular verbs.

Unit - III LSRW SKILLS & GRAMMAR

Receptive Skills (Listening, Reading and Scanning) & Productive Skills (Writing, Speaking and Representing) (8)

Listening – Listening for specific task – fill in the gaps.**Speaking** – Phonemes – Syllables – Role play – Conversation Practice.**Reading** –comprehension passages based on general topics or matters of current affairs. **Writing -** Autobiographical writing & Biographical writing.

Grammar&Vocabulary (Function Grammar & Technical Vocabulary)

Preposition – Infinitive & Gerund. **Vocabulary** – Foreign words used in English – British and American usage.

Unit- IV LSRW SKILLS & GRAMMAR, CAREER ORIENTED

Receptive Skills (Listening, Reading and Scanning) & Productive Skills (Writing, Speaking and Representing) (10)

Listening – Responding to questions – Reading in class for complete understanding and for better pronunciation. **Speaking** – Debate- Presentations in seminars.**Reading** – Making inference from the reading passage – Predicting the content of reading passages. **Writing -** Interpreting visual materials (tables, graphs, charts, etc) & Instruction writing.

Grammar&Vocabulary (Function Grammar & Technical Vocabulary)

Sentence pattern – Voice (active and passive voice). **Vocabulary** – One word substitution.

Unit- V LSRW SKILLS & GRAMMAR, FIELD WORK

Receptive Skills (Listening, Reading and Scanning) & Productive Skills (Writing, Speaking and Representing) (10)

Listening –Distinction between native and Indian English (Speeches by TED and Kalam). **Speaking**- Extempore talk –Just-a-minute talk.**Reading**-Reading strategies–Intensive reading – Text analysis.**Writing**- Creative writing – Writing circulars and notices – Writing proposal.

Grammar&Vocabulary (Function Grammar & Technical Vocabulary)

Direct and Indirect speech – Conditional sentences - Auxiliary verbs. **Vocabulary** – Abbreviations & Acronyms.

Note: Students shall have hands on training in improving listening skill in the language laboratory @ 2 periods per each unit.**TOTAL: 45 HRS**

TEXT BOOK:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Sangeeta Sharma , Meenakshi Raman	Technical Communication: Principles And Practice 2nd Edition	OUP, New Delhi.	2015

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Lakshminarayanan, K.R. & Murugavel, T.	Communication Skills for Engineers	SCITECH Publications, Chennai	2009
2	Rizvi Ashraf, M	Effective Technical Communication	Tata McGraw-Hill, New Delhi.	2007
3	Rutherford Andrea, J.	Basic	Pearson Education, New	2006

		Communication Skills for Technology	Delhi.	

WEBSITES:

www.learnerstv.com – Listening/ Speaking/ Presentation www.usingenglish.com – Writing/ Grammar www.englishclub.com – Vocabulary Enrichment/ Speaking www.ispeakyouspeak.blogspot.com– Vocabulary Enrichment/ Speaking www.teachertube.com – Writing Technically www.Dictionary.com – Semantic / Grammar

SEMESTER I& II

17BECC102 ENGINEERING MATHEMATICS I 3 2 0 4 100

OBJECTIVES:

1. To develop analyzing skills for solving different engineering problems.
2. To understand the concept of Matrices.
3. To remember the basics of differential calculus and its applications.
4. To apply the problems in differential equations.
5. To Create knowledge about vector differentiation.
6. To make the student to solve various Engineering problems

COURSE OUTCOMES:

1. Acquire the basic knowledge and understanding of mathematics.
2. Apply advanced matrix knowledge to engineering problems.
3. Understand the concepts of differential calculus problems.
4. Improve their ability in evaluating geometrical applications of differential calculus problems.
5. To solve the problems by applying the differential Equations.
6. Evaluating engineering problems involving vector differentiation.

UNIT I MATRICES (12)

Review of Matrix Algebra - Characteristic equation – Eigenvalues and Eigenvectors of a real matrix – Properties – Cayley-Hamilton theorem (excluding proof) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic forms – Reduction to canonical form through orthogonal reduction.

UNIT II DIFFERENTIAL CALCULUS (12)

Limits, Continuity (Concepts only)- Differentiation- Differentiation Techniques: standard formulae, product rule, quotient rule, chain rule, method of substitution, implicit functions and successive differentiation.

UNIT III GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS (12)

Curvature – centre, radius and circle of curvature in Cartesian co- ordinates – Evolutes – Envelope – Evolute as envelope of normals.

UNIT IV DIFFERENTIAL EQUATIONS (12)

Introduction to Ordinary differential equations: Linear ordinary differential equations of second and higher order with constant coefficients.

Introduction to Partial differential equations: Linear Partial differential equations of second and higher order with constant coefficients.

UNIT V VECTOR DIFFERENTIATION (12)

Vectors-Differentiation of vectors – scalar and vector point functions –vector operator – vector operator applied to scalar point functions: Gradient; vector operator applied to vector point functions: Divergence and curl; Physical interpretation of divergence and curl, solenoidal and irrotational vectors.

TOTAL: 60 HRS

TEXT BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Hemamalini. P.T	Engineering Mathematics	McGraw Hill Education (India) Private Limited, New Delhi.	2014
2	Sundaram, V. Lakhminarayan,K.A.&Balasubramanian, R.	Engineering Mathematics for first year.	Vikas Publishing Home, New Delhi.	2006
3	Bali, N.P. & Manish Goyal	A Text Book of Engineering Mathematics	Laxmi Publications Pvt. Ltd., New Delhi.	2014

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Grewel . B. S.	Higher Engineering Mathematics	Khanna Publications, New Delhi.	2014
2	BhaskarRao. P. B, Sri Ramachary SKVS, BhujangaRao. M	Engineering Mathematics I	BS Publications, India.	2010
3	Ramana. B.V	Higher Engineering Mathematics	Tata McGraw Hill Publishing Company, New Delhi.	2007
4	ShahnazBathul	Text book of Engineering	PHI Publications, New Delhi.	2009

		Mathematics(Special Functions and Complex Variables)		
5	Michael D. Greenberg	Advanced Engineering Mathematics	Pearson Education, India	2009

WEBSITES:

1. www.efunda.com
2. www.mathcentre.ac.uk
3. www.intmath.com/matrices-determinants
4. www. Intmath.com/calculus/calculus-intro.php

17BEPH103 SEMESTER I& II

17BEPH203 ENGINEERING PHYSICS 3 0 0 3 100

OBJECTIVES:

1. To understand the properties of matter and thermodynamics with its applications.
2. To introduce the concepts of light, laser and fiber optics for diverse applications.
3. To study the fundamentals of quantum physics and their applications.
4. To comprehend the properties of crystal and its various crystal structures.
5. To study the basics of sound and ultrasonics with appropriate applications.
6. To solve the relevant problems in engineering stream.

COURSE OUTCOMES:

1. Identify the elastic nature of materials and its thermodynamic properties.
2. Infer the characteristics of laser and optical fibers for engineering applications.
3. Develop the idea of quantum mechanics through applications.
4. Identify the different atomic arrangements of crystals and its defects.
5. Make use of the concepts of sound waves for medical applications.
6. Illustrate the basic ideas of nuclear reactors for energy resources.

UNIT I PROPERTIES OF MATTER AND THERMODYNAMICS (9)

Three types of modulus of elasticity – basic definitions, relation connecting the modulii (Derivation), Poisson's ratio- Torsional pendulum- bending of beams- bending moment – uniform and non uniform bending

Concept of entropy- change of entropy in reversible and irreversible processes – refrigeration.

UNIT II LASER AND FIBER OPTICS (9)

Introduction – emission and absorption process- Einstein's coefficients derivation. Types of LASER - CO_2, Semiconductor LASER- Applications of LASER in industry and medicine.

Total internal reflection – modes of propagation of light in optical fibers – numerical aperture and acceptance angle –derivations, types of optical fibers (Material, refractive index and mode) – fiber optical communication system (block diagram)

UNIT III QUANTUM PHYSICS (9)

Introduction to quantum theory – Black body radiation - dual nature of matter and radiation – de Broglie wavelength, uncertainty principle –Schrödinger's wave equation – time dependent and time independent equations – particle in one dimensional box- physical significance of wave function, scanning electron microscope

UNIT IV CRYSTAL PHYSICS (9)

Lattice – unit cell – Bravais lattice – calculation of number of atoms per unit cell, atomic radius, coordination number, packing factor for SC, BCC, FCC and HCP structures, crystal defects – point, line and surface defects

UNIT V ULTRASONICS AND NUCLEAR PHYSICS (9)

Production of ultrasonics by piezoelectric method –Non Destructive Testing – pulse echo system through transmission and reflection modes - A, B and C – scan displays, Medical applications – Sonogram. Introduction – basics about nuclear fission and fusion, Radiation detectors – semi conductor detector. Reactors – essentials of nuclear reactor- power reactor.

TOTAL: 45 HRS

TEXT BOOK:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Ganesan.S and Baskar.T	Engineering Physics I	GEMS Publisher, Coimbatore-641 001	2015

REFERENCES:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Serway and Jewett	Physics for Scientists and Engineers with Modern Physics	Thomson Brooks/Cole, Indian reprint, New Delhi	2010
2	Gaur, R.K. and Gupta, S.C	Engineering Physics	DhanpatRaiPublications,New Delhi.	2011
3	M.N. Avadhanulu and PG Kshirsagar	A Text book of Engineering Physics	S.Chand and company, Ltd., New Delhi	2011
4	**D.C. Ghosh, N.C. Ghosh, P.K. Haldar**	Engineering Physics	University Science, New Delhi	2011
5	**P. Khare, A. Swarup**	Engineering Physics: Fundamentals and Modern	Jones & Bartlett Learning	2009

WEBSITES:

- www.nptel.ac.in
- www.physicsclassroom.com
- www. oyc.yale.edu
- www.physics.org

17BECH103SEMESTER I& II

17BECH203 ENGINEERING CHEMISTRY 3 0 0 3 100

OBJECTIVES:

1. To make the students conversant with basics of water technology.
2. To make the student acquire sound knowledge of electrochemistry and storage devices.
3. To acquaint the student with concepts of fuels and combustion.
4. To develop an understanding of the basic concepts of corrosion science.
5. To acquaint the students with the basics of surface chemistry.
6. To understand the chemical principles in the projects undertaken in field of engineering and technology

COURSE OUTCOMES:

1. Outline the basic principles of chemistry for water treatment (K).
2. Examine the electrochemical properties to design non – conventional energy storage devices (S).
3. Apply the concepts combustion of different fuels (S).
4. Identify the concepts of corrosion and its protection in the engineering field (S).
5. Apply the concepts of surface chemistry in the field of engineering (S).
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (S).

UNIT I WATER TECHNOLOGY (9)

Sources-Characteristics – Specification for drinking water, BIS &WHO-Alkalinity – Types of alkalinity and determination (No problems) – Hardness – Types and estimation by EDTA method (No problems) - Domestic water treatment – Disinfection methods (Chlorination, Ozonation. UV treatment) – Boiler feed water – Requirements – Disadvantages of using hard water in boilers – Internal conditioning (Phosphate, Calgon and Carbonate conditioning methods) – External conditioning – Demineralization process – Desalination - Reverse osmosis.

UNIT II ELECTROCHEMISTRY AND STORAGE DEVICES (9)

Electrochemical cells – EMF – Measurement of emf – Single electrode potential – Nernst equation – Reference electrodes –Standard Hydrogen electrode -Calomel electrode – Ion selective electrode – Glass electrode and measurement of pH – Electrochemical series – Significance – Potentiometric titrations (Redox - Fe^{2+}vs dichromate) –Electrolytic conductance-application (conductometric titration)-Batteries- Primary batteries-Leclanche cell- Secondary batteries- Lead acid battery. An introduction to Fuel Cell- H_2-O_2 Fuel Cell.

UNIT III FUELS AND COMBUSTION (9)

Coal - Proximate and Ultimate analysis - Metallurgical coke - Manufacture by Otto-Hoffman method - Petroleum processing and fractions - Synthetic petrol - Bergius and Fischer-Tropsch method - Knocking - Octane number and Cetane number - Gaseous fuels - Water gas, Producer gas, Combustion of fuel-Introduction-GCV-NCV- Problems on Calculation of GCV &NCV - Flue gas analysis.

UNIT IV CORROSION SCIENCE (9)

Chemical and Electrochemical corrosion - Galvanic corrosion - Differential aeration corrosion - Corrosion control - Sacrificial anode and Impressed current cathodic methods - Corrosion inhibitors - Protective coatings – Organic coatings-Paints - Constituents and functions –Inorganic coatings- Metallic coatings - Electroplating (Au) and Electro less plating (Ni) - Surface conversion coating - Hot dipping.

UNIT V SURFACE CHEMISTRY AND PHASE RULE (9)

Introduction-Adsorption-Types, adsorption of gases on solids, adsorption of solutes from solutions, Adsorption isotherms-Freundlich adsorption isotherm-Langmuir adsorption isotherm-Role of adsorbents in industries (catalysis and water softening).

Phase Rule: Definition -Phase diagrams – one component water system, two component Ag-Pbsystem.

TOTAL: 45 HRS

TEXT BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Dr. Vairam.S	Engineering Chemistry	Gems Publishers, Coimbatore.	2014
2.	Dr.Ravikrishnan.A	Engineering Chemistry I& II	Sri Krishna Hi tech Publishing Company (P) Ltd., Chennai.	2012

REFERENCE BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Raman Sivakumar	Engineering Chemistry I &II	McGraw-Hill Publishing Co.Ltd., 3rd Reprint NewDelhi.	2013
2.	Kuriakose. J.C. and Rajaram	Chemistry in Engineering and Technology. Vol. I & II 5th edition.	Tata McGraw Hill Publishing Company, New Delhi.	2010
3.	Jain, P.C. and Monika Jain	Engineering Chemistry.	DhanpatRai Publishing Company (P) Ltd., New Delhi.	2009
4.	Dara.S.S	Text book of Engineering	S.Chand&Co.Ltd., New Delhi	2008

		Chemistry.		
5.	Sharma.B. K	Engineering Chemistry	Krishna Prakasam Media (P) Ltd., Meerut	2001

WEBSITES:

1.http://www.studynotes.ie/leaving-cert/chemistry/
2. http://www.rejinpaul.com/2011/04/engineering-chemistry-ii-second.html
3.http://www.learnerstv.com/Free-chemistry-Video-lectures-ltv044-Page1.htm
4. http://ocw.mit.edu/courses/#chemistry
5. http://www.chem.qmul.ac.uk/surfaces/sec

SEMESTER I& II

17BECE104 BASIC CIVIL ENGINEERING 3 0 0 3 100

COURSE OBJECTIVES:

1. To know about different materials and their properties
2. To know about engineering aspects related to buildings
3. To know about importance of surveying and the transportation systems
4. To get exposed to the rudiments of engineering related to dams, water supply, and sewage disposal
5. To gain the knowledge of storage of water, retaining structures, water treatment for drinking purpose, collection of sewage
6. To know the method of disposal with functional units

INTENDED OUTCOMES:

1. To impart the properties of various building materials
2. To understand various building components and its uses.
3. To measure the linear distance by using survey equipment's and to find out the Longitude and latitude of an object.
4. To understand the formation of roads and formation – Bridge and its uses.
5. To know about the storage of water, retaining structures, water treatment for drinking purpose, collection of sewage and to know the method of disposal with functional units
6. Will gain basic knowledge about Civil Engineering Field.

UNIT I SCOPE OF DIFFERENT FIELDS OF CIVIL ENGINEERING 9 Structural Engineering, Geotechnical Engineering, Environmental Engineering, Water Resources Engineering, Transportation Engineering. Recent development in construction techniques – case study

UNIT II – BUILDINGS AND BUILDING MATERIALS 9

Buildings -Definition-Classification according to NBC-plinth area, Floor area, carpet area, floor space index construction materials-stone, brick, cement, cement-mortar, concrete, steel- their properties and uses.

UNIT III - BUILDINGS AND THEIR COMPONENTS 9

Buildings- Various Components and their functions. Soils and their classification - Foundations-Functions and types of foundations, Masonry, Floors-functions and types of floors, Roofs and types of roofs.

UNIT IV - BASIC INFRASTRUCTURE 9

Surveying-classification, general principles of surveying – Basic terms and definitions of chain, compass
and leveling surveying , uses of surveying.
Roads-types, Water bound macadam road, cement concrete road, bituminous road. Bridges - components and types of bridges.

Dams-Purpose, selection of site, types of dams and components.

UNIT V – BUILDING DRAWING **9**

Types of drawing with appropriate scale & Uses of index map, key plan, village map, site plan, Layout plan –Types of Projection adopted in Building Drawing – Scales for various types of Drawings– Working drawing, large scale drawing– Symbols, Conventions and Abbreviations for – Electrical fittings , water supply ,sanitary fittings, materials of construction – Sizes of various standard papers.

. **TOTAL: 45 HRS**

TEXT BOOKS:

S.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Basics of Civil Engineering	Raju K.V.B, Ravichandran P.T	Ayyappa Publications, Chennai	2012
2	Civil engineering drawing	V. B. Sikka	B. D. KatariaSons , Ludhiana	2009

REFERENCE BOOKS:

S.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Civil Engineering	Ramesh Babu	VRB Publishers, Chennai	2010
2	Building Materials	National Building Code of India, Part V		2005
3	Engineering Materials	Rangwala S.C	Charotar Publishing House, Anand	2012

17BECE105A **SEMESTER I& II**

17BECE205A BASIC ELECTRICAL AND ELECTRONICS ENGINEERING 3 0 0 3 100

OBJECTIVES:

1. To impart the basic knowledge about the Electric circuits.
2. To understand the working of various Electrical Machines.
3. To know about various measuring instruments.
4. To understand the basic concepts in semiconductor devices and digital electronics.
5. To understand and analyze basic electric and magnetic circuits.
6. To gain the basic knowledge about the Electric circuits

INTENDED OUTCOMES

1. The students shall develop an intuitive understanding of the circuit analysis, basic concepts of electrical machines, basics of electronics and be able to apply them in practical situation.
2. To study the working principles of electrical machines and power converters.
3. To introduce the components of low-voltage electrical installations.
4. Gained the knowledge in working of Electrical Machines and Transformers.
5. Students will gain the applications of transformers.
6. To understand and analyze basic electric and magnetic circuits.

UNIT I ELECTRIC CIRCUITS & MEASUREMENTS 9

Ohm's Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase balanced Circuits.

UNIT II ELECTRICAL MACHINES 9

Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, single phase induction Motor.

UNIT III MEASURING INSTRUMENTS 9

Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.

UNIT IV SEMICONDUCTOR DEVICES AND APPLICATIONS 9

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation. Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics

UNIT V- DIGITAL ELECTRONICS 9

Number systems – binary codes - logic gates - Boolean algebra, laws & theorems- simplification of Boolean expression - implementation of Boolean expressions using logic gates - standard forms of Boolean expression.

TOTAL: 45 HRS

- ***TEXT BOOKS***

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Mittle, V.M	Basic Electrical Engineering	Tata McGraw Hill Edition, New Delhi	2004
2	SedhaR.S	Applied Electronics	S. Chand & Co	2006

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- ***REFERENCES***

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Muthusubramanian R, and Muraleedharan K A	Basic Electrical, Electronics and Computer Engineering	Tata McGraw Hill, Second Edition	2006
2	Nagsarkar T K and Sukhija M S	Basics of Electrical Engineering	Oxford press	2005
3	MahmoodNahvi and Joseph A. Edminister	Electric Circuits	Schaum' Outline Series, McGraw Hill	2002
4	Premkumar N	Basic Electrical Engineering	Anuradha Publishers	2003

17BECE105B **SEMESTER I& II**

17BECE205B ELEMENTS OF MECHANICAL ENGINEERING 3 0 0 3 100

OBJECTIVES

1. To expose the thrust areas in Mechanical Engineering and their relevance by covering fundamental concept.
2. To familiarize with the basic machine elements.
3. To familiarize with the Sources of Energy and Power Generation.
4. To familiarize with the various manufacturing processes.
5. To know about basic machining process.
6. To gain the basic manufacturing and machining processes

OUTCOMES:

1. To impart the basic knowledge of various basic fields of mechanical engineering.
2. Gain the basic manufacturing and machining processes.
3. Able to know about basic machining process.
4. Study about the operations of power plants.
5. Know about the automobile engineering
6. The principles of refrigeration and air- conditioning

UNIT I MANUFACTURING PROCESSES 9

Casting process – Operation of Cupola furnace. Patterns -Moulding tools - Types of moulding - Preparation of green sand mould.

UNIT II METAL FORMING AND JOINING PROCESSES 9

Metal forming processes – Rolling, forging, drawing, extrusion and sheet metal operations-fundamentals only. Metal Joining processes – Welding - arc and gas welding, Soldering and Brazing.

UNIT III MACHINING OPERATIONS 9

Basics of metal cutting operations – Working of lathe parts of lathe-Operations performed on lathe. Milling machine – Horizontal and vertical milling machine - Milling operations. Drilling machine – Classification – Radial drilling machine - Twist drill nomenclature. Introduction to CNC and VMC.

UNIT IV POWER PLANTS 9

Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydro-electric plants, Nuclear Power plants – Solar and Wind Power plants.

UNIT V REFRIGERATION AND AIR- CONDITIONING 9

Principle of vapour compression system- Layout of typical domestic refrigerator – Basic of Psychrometry - Window and Split type room Air conditioner.

TOTAL: 45 HRS

- ***TEXT BOOK***

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Venugopal K. and Prahu Raja V	Basic Mechanical Engineering	Anuradha Publishers, Kumbakonam	2000
2	Shanmugam G and Palanichamy M S	Basic Civil and Mechanical Engineering	Tata McGraw Hill Publishing Co., New Delhi	1996

- ***REFERENCE***

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Shantha Kumar S R J	Basic Mechanical Engineering	Hi-tech Publications, Mayiladuthurai	2000

17BEPH111 **SEMESTER I& II**

17BEPH211 **ENGINEERING PHYSICS LABORATORY** **0 0 4 2 100**

OBJECTIVES:

1. To develop basic laboratory skills and demonstrating the application of physical principles.
2. To prepare for the lab experiment and perform individually a wide spectrum of experiments.
3. To present experimental data in various appropriate forms like tabulation, and plots.
4. To analyze, Interpret and Summarize experimental results.
5. To communicate clearly understanding of various experimental principles, instruments/setup, and procedure.
6. To develop the skills for understanding basic electric circuits.

COURSE OUTCOMES:

1. The students will have the knowledge on Physics practical experiments and that knowledge will be used by them in different engineering and technology applications.
2. Prepare for the lab experiment and perform individually a wide spectrum of experiments.
3. Present experimental data in various appropriate forms like tabulation, and plots.
4. Analyze, Interpret and Summarize experimental results.
5. Communicate clearly understanding of various experimental principles, instruments/setup, and procedure.
6. Prepare to develop the skills for understanding basic electric circuits.

LIST OF EXPERIMENTS – PHYSICS

1. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
2. Determination of wavelength of mercury spectrum – spectrometer grating.
3. Determination of Young's modulus of the material – Non uniform bending (or) Uniform bending.
4. Determination of Viscosity of liquid – Poiseuille's method.
5. Spectrometer Dispersive power of a prism.
6. Torsional pendulum – Determination of Rigidity modulus.
7. Particle size determination using Diode Laser
8. Determination of Laser parameters – Wavelength, and angle of divergence.
9. Determination of acceptance angle in an optical fiber.
10. Determination of thickness of a thin wire – Air wedge method
11. Determination of Band Gap of a semiconductor material.
12. Determination of Specific resistance of a given coil of wire – Wheatstone Bridge

17BECH111 SEMESTER I& II

17BECH211 ENGINEERING CHEMISTRY LABORATORY 0 0 4 2 100

OBJECTIVES:

1. To provide students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence.
2. To estimate the amount of alkalinity ions, hardness, chloride in water sample
3. To make the student acquire practical skills in the determination of conductance of solutions, EMF etc
4. To acquaint the students with the determination of molecular weight of a polymer by viscometry
5. To carried out different types of titrations for estimation of concerned in materials
6. To determine the corrosion rate of steel by weight loss method.

COURSE OUTCOMES:

1. The students will be outfitted with hands-on knowledge in quantitative chemical analysis of water quality parameters and corrosion measurement.
2. Estimate the amount of alkalinity ions, hardness, chloride in water sample
3. Measure molecular/system properties of conductance of solutions, EMF etc
4. Acquaint the students with the determination of molecular weight of a polymer by visocometry
5. Determine the corrosion rate of steel by weight loss method.
6. Carrying out different types of titrations for estimation of concerned in materials using comparatively more qualities and quantities of materials involved for accurate results.

LIST OF EXPERIMENTS – CHEMISTRY

1. Estimation of alkalinity of Water sample.
2. Estimation of hardness of Water by EDTA
3. Estimation of chloride in Water sample (Argentometric method)
4. Determination of corrosion rate by weight loss method.
5. Conductometric Titration (Simple acid base).
6. Conductometric Titration (Mixture of weak and strong acids).
7. Conduct metric Titration using $BaCl_2$vs Na_2 SO_4.
8. pH Titration (acid & base).
9. Potentiometric Titration (Fe^{2+} / $KMnO_4$ or $K_2Cr_2O_7$).
10. Estimation of Ferric ion by Spectrophotometry.
11. Determination of water of crystallization of a crystalline salt (Copper sulphate).
12. Determination of molecular weight and degree of polymerization using Viscometry.
13. Determination of chemical oxygen demand.

SEMESTER I &II

17BECE112 ENGINEERING GRAPHICS 10 33 100

OBJECTIVES

1. To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
2. To expose them to existing national standards related to technical drawings.
3. To give exposure to solid modeling,computer-aided geometric design, creating working drawings and engineering communication.
4. To develop graphic skill for communication of concepts, ideas and design of engineering products.
5. To give exposure to existing national standards related to technical drawings.
6. To gather skills in technical drawing.

OUTCOMES:

On Completion of the course the student will be able to

1. perform free hand sketching of basic geometrical constructions and multiple views of objects.
2. do orthographic projection of lines and plane surfaces.
3. draw projections and solids and development of surfaces.
4. prepare isometric and perspective sections of simple solids.
5. demonstrate computer aided drafting.
6. Will gather skills in technical drawing

UNIT I INTRODUCTION 9

Introduction to Engineering Drawing, Bureau of Indian Standards (BIS), Layout of drawing sheets, sizes of drawing sheets, different types of lines used in drawing practice geometric constructions, principles of dimensioning– linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension.

UNIT II CALES AND PLANE CURVES8

SCALES:Reducing Scale, Enlarging Scale, Plain Scale, Diagonal Scale and Vernier Scale. Conics – Construction of Ellipse, Parabola and Hyperbola by eccentricity method

UNIT III REE HAND SKETCHING9

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT IV ROJECTION OF POINTS, LINES AND PLANE SURFACES 8

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Traces–Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT V ROJECTION OF SOLIDS 8

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

Introduction to Drafting Software/Package (Not for Exam)

Basic operation of drafting packages, use of various commands for drawing, dimensioning, editing, modifying, saving and printing/plotting the drawings. Introduction to 3D primitives.

TOTAL 5 HRS

- ***TEXT BOOKS***

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Venugopal K and Prabhu Raja V	Engineering Graphics	ew Age International Publishers	2007
2	TU	Primer on Computer Aided Engineering Drawing	elgaum	2006

- ***REFERENCES***

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	umar M S	ngineering Graphics	D Publications, Chennai	2007
2	ureau of Indian Standards	ngineering Drawing Practices for Schools and Colleges SP 46-2003	IS, New Delhi	2003
3	uzadder W J	ndamentals of Engineering Drawing	entice Hall Book Co., New York	1998

WEB REFERENCES

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 and 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 and SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 and SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

SEMESTER I & II

17BECE113COMPUTER PRACTICE AND PROGRAMMING LABORATORY1 0 4 3 100

OBJECTIVES:

1. To familiarize with open source office packages
2. To write programs for Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings and Functions.

INTENDED OUTCOME:

1. Study, analyze and understand logical structure of a computer program, and different construct to develop a program in 'C' language

THEORY:

What is computer- Computer Components- What is C- C Character set- Constants, Variables and Keywords-General form of C Program - Relational and Logical Operators - Selection Structures- If and nested if - Switch Case - Loops-Definition and types- Functions- Arrays- Introduction to Strings-Pointers.

PRACTICALS:

1. Working with word Processing, Spreadsheet and presentation software in Linux

2. Programming in Scratch:
   Practicing fundamental concepts of programming like sequence, selection decision statements, working of loops and event driven programming

3. C Programming:
   Practicing programs to get exposure to basic data types, algebraic expressions, Conditional statements, Input and Output Formatting, Decision Statements, Switch Case, Control structures, arrays, Strings and function, implementation of pointers.

REFERENCES:

1. E. Balagurusamy, " Computing Fundamentals and C Programming", TMH Education, 5th Edition, 2014
2. YashavantKanetkar, " Let us C", BPB Publications, 13th Edition, 2013

VALUE ADDED COURSE

17BECC151 YOGA 1 0 0 100

Course Objective:

- To get knowledge about Concept of yoga
- To get knowledge about systems of yoga
- To get knowledge of different asanas
- To get knowledge of different advance asanas
- To get knowledge of pranayama
- To get knowledge mudras

Course Outcomes:

Yoga Education Helps to Develop

- The Self Discipline,
- Self Control,
- Physical health,
- Concentration
- Higher Level Of Consciousness.
- Mental Health

UNIT- I

Introduction To Yoga- Meaning Of Yoga – Concept Of Yoga- Aim And Objectives Of Yoga – History Of Yoga - Systems Of Yoga.- Stages (Or) Limbs Of Yoga

UNIT- II

Asanas-Surya Namashkar- Thdasana- Veerabadhra Asana- Trikonasana- Utkatasana- ArdhaChakrasana- Ardha Kati Chakrasana- Thandasana- Gomugasana- Padmasana- Vajrasana- Paschimottasana- Matsyendrasana-BavanaMukthasana- SuptaPadhangusthasana-Sethubhandhasana- Navasana- ArdhaBavanamukthasana- Mathasyasana- Naukasana- Bujangasana- Salabasana- Makkarasana-Dhanurasana.

UNIT- III

Advance Asanas- Sirasasana- Garudasana- Natrajasana- Rajakoptasana- Chakrasana- Kukutasana- Virikshasana- Sarvagasana- Halasana-. Mayurasana .

UNIT- IV

Pranayama- Meaning- Types Of Pranayama- Bhastrika- Bhramari- Udgeeth- Kabalbhati- Bahya- AnulomVilom- Pranay Pranayama- Benefits Of Pranayama. Neti - JalaNeti , Sutra Neti, Nouli-Three Types, Douthy-Three Types

UNIT- V

Mudras- Uses Of Mudras- Gyan- Shoonya- Apaan- Prana- Vayu- Prithvi- Linga- Apana- Adi Mudra- - Agni Mudra- Surya Mudra- Varuna- Hakini Mudra.

REFERENCES:

S.No	Author Name	Title Of Book	Publisher	Year of Publication
1.	Dr.K.Chandrasekaran	Sound Health Through Yoga	PremKalyan	2009
2.	B.K.S.Iyangar	Light On Pranayama	Crossroad Centuary	2013
3.	Thirumular	Thirumandhiram	Sriramakrishna Math	2016

SEMESTER I &II

17BECC201A BUSINESS COMMUNICATION 3 0 0 3 100

OBJECTIVES:

1. To help students comprehend the role of listening skills in effective communication.
2. To familiarize students with verbal and non-verbal communication.
3. To expose students to neutral accent.
4. To develop emotional intelligence skills in them for enhancing their self-esteem.
5. To assist them in setting goals and developing positive attitude.
6. To enable students to acquire decision making skills, problem solving skills and assertive skills.
7. Todevelop their soft skills and inter personal skills.

COURSE OUTCOMES:

1. Design and deliver a persuasive presentation that convinces the audience of the topic's relevance and overcomes resistance, using appropriate visual support and adhering to a specified time limit.
2. Use a strategic communication model and critical thinking to identify objectives, analyze audiences and choose the most effective structure and style for delivering strategically sound written and spoken messages.
3. Practice principles of effective business writing and document design in all written documents.
4. Build an understanding of different organizational cultures, business practices, and social norms to communicate more effectively in domestic and cross-cultural business contexts.
5. To gain confidence in using English language in real life situations.
6. Develop their soft skills and inter personal skills, which will make the transition from college to workplace smoother and help them excel in their job.

UNITI 9

What is Business Communication? - Types of Communication – Formal and informal communication – Process of Communication- modes of Communication – Barriers to communication.

UNITII 9

Written Business Communication – Style- word-usage- organisation of Ideas – mechanics of writing and fill up of forms - Cover Letter- Letter for Job Application- Letter of Complaint - Memos - Resumes - Email- Reports Revising and proofreading- Advertising slogans- jargons- Description of Graphics and visual aids - interpretation of graphs using expressions of comparison and contrast .

UNIT III 9

Reading and Understanding the news articles - Oral Business Communication - First Impressions - Attire – Effective Presentation strategies- Nuances of delivery – Controlling nervousness and stage fright- Visual aids Presentations- Capturing Audience - Tone - Behavior - Telephone Etiquette- Non - verbal communication - Eye contact - Facial expressions - Posture - Gestures - Body langage – Etiquette- Organization of presentation – brain storming- Negotiations.

UNIT - IV **9**

Difference between goals and dreams - SMART goal setting - 3 Ds of goal setting- Determination, Discipline and Direction - Developing the right attitude - Motivation - Intrinsic and Extrinsic motivation - Dealing with change - Dedication - Taking responsibilities - Decision making.

UNIT - V **9**

Intrapersonal skills - Self-analysis - Thought process – Interpersonal skills - Confidence building - Resolving conflicts- Analytical skills - Team Building - Leadership skills - Planning/organizing - Ability to work independently - Professional ethics - Communicating via e-mail. Ethical perspectives and their implications for responsible communication - Proposal Presentation

TOTAL-45 HRS

TEXT BOOK:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Meenakshi Raman ; Prakash Singh	Business Communication	Oxford University Press	2012

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Murthy, G .R. K.	Soft Skills for Success**.**	The ICFAI University Press, Hyderabad.	2008
2	Jagadeesan, G &Santanakrishnan, R.	Soft Skills Development:Training and Evaluation.	The ICFAI University Press, Hyderabad.	2008
3	Sherfield, Robert M., Rhonda J. Montgomery, & Patricia G. Moody	Developing Soft Skills.	Pearson Education, New Delhi.	2005

WEBSITES

http://tribehr.com/social-hr-software/talent-management/skills-tracking
www.ispeakyouspeak.blogspot.com
https://alison.com/subjects/6/Personal-Development-Soft-Skills
www.learning-development.hr.toolbox.com
http://www.niit.com/solution/soft-skill-training
http://mybcommlab.com to test your understanding of the concepts presented in each chapter and explore additional materials that will bring the ideas to life in videos, activities, and an online multimedia e-book.

SEMESTER I &II

17BECC201B TECHNICAL ENGLISH 3 0 0 3 100

OBJECTIVES:

1. To motivate learners to acquire listening & speaking skills in both formal and informal context.
2. To focus on question forms & to make them understand the importance of using question tags and also the functional use of transformation of sentences.
3. To improve their reading habit and to train them in critical and analytical reading.
4. To equip them to write for academic as well as work place context.
5. To enable students to face interviews.
6. To improve the student's communication skill at business level.

COURSE OUTCOMES:

1. To acquire second language: speaking convincingly, expressing their opinions clearly, negotiating and arguing using appropriate communicative strategies.
2. To enhance them reading texts critically and analytically.
3. To develop writing effectively, persuasively and producing different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
4. To enrich the ability to face interviews the confidence.
5. To help students develop listening skills for academic and professional purposes.
6. To enable students write letters effectively in informal and business situations.

UNIT-1 (10)

Listening - Difference between Hearing & Listening –Listening to informal conversation. **Speaking** - Spoken structures on different situations - Introduction, Greeting, Comments on topics like Films, Games etc, Excuse, Request, Agreement, Disagreement, etc., **Reading** – Extensive and Intensive reading. **Writing** – Report writing - Writing a covering letter. **Grammar** – Regular & Irregular verbs - Kinds of sentences - Question tags. **Vocabulary** – Homonyms and Homophones.

UNIT-II (8)

Listening – Note Taking- Improving grasping ability. **Speaking** – Welcome address - Vote of thanks - Master of ceremony. **Reading** – Active and Passive reading - Reading for vocabulary- Reading for a purpose. **Writing** - Writing a review (Film review) - Summary of a story. **Grammar** - Modal verbs – Conjunction - Expression of cause and effect. **Vocabulary** - Phrasal verbs - Idioms.

UNIT – III (9)

Listening - Barriers to listening (Physical, Psychological, Linguistic & Cultural). **Speaking** – Stress, Pause and Intonation. **Reading** – Rapid reading – Skimming, Scanning and Surveying. (SQ3R)**Writing** - Essay writing -Minutes of meeting - Agenda – **Grammar** - Active and Passive voice - Purpose expression. **Vocabulary** - Same words used as noun and verb - Often misspelt and confused words.

UNIT-IV (8)

Listening – Listening to telephone conversation - Viewing model interviews. **Speaking** – Group Discussion - Correlation between verbal & non - verbal communication. **Reading** – Reading comprehension (short & long text) - Reading job advertisements and profile of a company. **Writing** – Job application - Resume writing - Checklist preparation. **Grammar** - Numerical expressions – Collocations - **Vocabulary** - Singular and Plural (Nouns)

UNIT- V **(10)**

Listening – Types of listening- Improving listening comprehension**. Speaking** - Oral presentation - Vocal communication techniques - Voice, quality, volume, pitch etc., **Reading** -Note making - Making notes from books/ any forms of writing materials. **Writing** - Describing process & products - Recommendation writing – Short essays writing- **Grammar**- Transformation of sentences (Simple, Compound & Complex). **Vocabulary** - Collection of Technical Vocabularies with their meanings.

Note: Students shall have hands on training in improving listening skill in the language laboratory @ 2 periods per each unit.

TOTAL-45 HRS

TEXT BOOK:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Sangeeta Sharma , Meenakshi Raman	Technical Communication: Principles And Practice 2nd Edition	OUP, New Delhi.	2015

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Lakshminarayanan, K.R. & Murugavel, T.	Communication Skills for Engineers	SCITECH Publications, Chennai	2008
2	Rizvi Ashraf, M	Effective Technical Communication	Tata McGraw-Hill, New Delhi.	2007
3	Rutherford Andrea, J.	Basic Communication Skills for Technology	Pearson Education, New Delhi.	2006

WEBSITES :

www.learnerstv.com – Listening/ Speaking/ Presentation
www.usingenglish.com – Writing/ Grammar
www.englishclub.com – Vocabulary Enrichment/ Speaking
www.ispeakyouspeak.blogspot.com– Vocabulary Enrichment/ Speaking
www.teachertube.com – Writing Technically

SEMESTER I &II

17BECC202 ENGINEERING MATHEMATICS II 3 2 0 4 100

OBJECTIVES:

1. To have knowledge in integral calculus.
2. Determine mathematical tools needed in evaluating multiple integrals and their usage.
3. Utilize Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.
4. Apply the knowledge of Mathematics in various Engineering fields by making them to identify the functions in engineering problems as analytic function and their analyze as a function of a complex variables.
5. Develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, to specify some difficult integration that appear in applications can be solved by complex integration in application areas such as fluid dynamics and flow of the electric current.
6. To understandrelations between conformal mappings and quadratic differentials.

COURSE OUTCOMES:

1. The student will be able to solve problems in Fluid Dynamics, Theory of Elasticity, Heat and Mass Transfer etc.
2. The students will be able to understand mathematical tools needed to evaluate the areas and volumes using multiple integrals.
3. To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage. Use Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.
4. To find the Analytic functions using the Cauchy Riemann equations and they will learn mapping properties of elementary functions and mapping properties of some special transcendental functions.
5. Students will understand relations between conformal mappings and quadratic differentials and how geometric structures are changing under conformal mappings.
6. To evaluate complex integrals using the Cauchy integral formula and the residue Theorem and to appreciate how complex methods can be used to prove some important theoretical results.

UNIT I INTEGRAL CALCULUS (12)

Definite and indefinite integrals – Substitution rule – Techniques of integration – Integration by parts - Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions – Improper Integrals.

UNIT II MULTIPLE INTEGRALS (12)

Double integral – Cartesian coordinates – Polar coordinates – Area as double integrals- Change the order of integration – Triple integration in Cartesian co-ordinates.

UNIT III VECTOR INTEGRATION (12)

Integration of vectors – line integral- surface integral- volume integral- Green's theorem - Gauss

divergence theorem and Stoke's theorems (Statement Only), hemisphere and rectangular parallelopipeds problems.

UNIT IV ANALYTIC FUNCTIONS (12)

Analytic functions - Cauchy-Riemann equations in Cartesian and polar forms – Sufficient condition for an analytic function (Statement Only) - Properties of analytic functions – Constructions of an analytic function - Conformal mapping: w = z+a, az, 1/z and bilinear transformation.

UNIT V COMPLEX INTEGRATION (12)

Complex Integration - Cauchy's integral theorem and integral formula (Statement Only) – Taylor series and Laurent series - Residues – Cauchy's residue theorem (Statement Only) - Applications of Residue theorem to evaluate real integrals around unit circle and semi-circle (excluding poles on the real axis).

TOTAL : 60 HRS

TEXT BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Hemamalini. P.T	Engineering Mathematics I & II	McGraw-Hill Education Pvt.Ltd, New Delhi	2014
2	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2014

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Erwin Kreyszig	Advanced Engineering Mathematics.	John Wiley & Sons. Singapore	2011
2	Venkataraman, M. K.	Engineering Mathematics.	The National Publishing Company, Chennai	2005
3	Narayanan. S, Manicavachagampillay.T.K and Ramaniah.G	Advanced Mathematics for EngineeringStudents.	Viswanathan S.(Printers and Publishers) Pvt. Ltd. Chennai.	2002
4	Michael D. Greenberg	Advanced Engineering Mathematics	Pearson Education, India	2009

WEBSITES:

1.www.efunda.com
2. www.mathcentre.ac.uk
3. www.sosmath.com/diffeq/laplace/basic/basic.html
4. www.mathworld.wolframe.com

SEMESTER I &II

17BECC204 ENVIRONMENTAL SCIENCES 3 0 0 3 100

OBJECTIVES:

1. To give a comprehensive insight into natural resources.
2. To impart knowledge on ecosystem and biodiversity.
3. To educate the ways and means of the environment.
4. To protect the environment from various types of pollution.
5. To impart some fundamental knowledge on human welfare measures.
6. To apply systems concepts and methodologies in their core fields.

COURSE OUTCOMES:

1. Recognize the importance of natural resources (S).
2. Associate themselves with the various ecosystems (S).
3. Describe the importance of biodiversity (S).
4. Identify and minimize the difference pollutions (S).
5. Prioritize and analyses the social issues (S).
6. Integrate the environmental principles in the projects undertaken in field of engineering and technology (A).

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES (9)

Definition, Scope and Importance – Need for public awareness -Forestresources: Useandover-exploitation, deforestation- Water resources-Use and over-utilization of surface and ground water, floods, drought, conflicts over water- Land resources-Land as a resource, land degradation, man induced landslides, soil erosion and desertification –Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources- Food resources-World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture- Energy resources-Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources- role of an individual in conservation of natural resources.

UNIT II ECOSYSTEM (9)

Chemistry and Environment- Environmental segments, Composition and Structure of atmosphere- Concept of an ecosystem- Structure, components and function of an ecosystem Energy flow in the ecosystem – Food chain, Food web and Ecological pyramids, Structure and function of Terrestrial ecosystem (Forest, Desert and Grassland ecosystem) and Aquatic ecosystem (Fresh water and Marine ecosystem

UNIT III BIODIVERSITY (9)

Introduction to biodiversity, Definition- Geneticdiversity, Speciesdiversity and Ecosystem diversity, Biogeographical classification of India, Importance of biodiversity-Value of biodiversity - Hot Spots of biodiversity-Threats to biodiversity - Endangered and Endemic Species of India – Conservation of biodiversity- In-Situ and Ex-Situ conservation of biodiversity.

UNIT IV ENVIRONMENTAL POLLUTION (9)

Definition – causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution and Thermal pollution. Solid waste management-causes, effects and control measures of urban and industrial wastes– Role of an individual in prevention of pollution–Disaster management-earthquake, tsunami, cyclone and landslides.

UNIT V SOCIAL ISSUES AND ENVIRONMENT (9)

From Unsustainable to Sustainable development, Urban problems related to energy sources, Water conservation, Rain water harvesting and Watershed management, Resettlement and rehabilitation of people, its problems and concerns, Environmental ethics- Issues and possible solutions- Climate change- Green house effect and Global warming, Acid rain, Ozone layer depletion, Wasteland reclamation- Environment Protection Act- Human Rights- Value education, Role of Information Technology in Environment and Human health-Population growth, Variation of population among nations-Population explosion.

TOTAL: 45 HRS

TEXT BOOKS:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Dr. Ravikrishnan, A	Environmental Science	Sri Krishna Hi tech Publishing Company Private Ltd., Chennai	2012
2.	Anubhakaushik C.P. Kaushik	Environmental Science and Engineering	New Age International (P) Ltd., New Delhi.	2010

REFERENCES:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	William P.Cunningham	Principles of Environmental Science	Tata McGraw -Hill Publishing Company, New Delhi.	2008
2.	Linda D. Williams	Environmental Science Demystified	Tata McGraw -Hill Publishing Company Ltd., New Delhi.	2005
3.	BharuchaErach	Environmental Science Demystified	Mapin Publishing (P) Ltd., Ahmedabad.	2005
4.	Tyler Miller G. Jr	Environmental Science	Thomson & Thomson Publishers, New Delhi.	2004
5.	Trivedi, R.K. and Goel, P.K	Introduction to Air Pollution	Techno-Science Publications, Jaipur.	2003

WEBSITES:

1. http://people.eku.edu/ritchisong/envscinotes1.html
2.http://nptel.ac.in/courses.php?disciplineId=120
3.www.newagepublishers.com/samplechapter/001281.
4.www.unesco.org/ext/field/beijing/scienceb.htm,www.infinitepower.org/education.htm
5. http://www.sciencedaily.com/news/top/environment/

ELECTIVE PAPER

SEMESTER I & II

17BECE212 ENGINEERING WORKSHOP PRACTICE 0 0 4 2 100

Course Objectives

- to prepare the students to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- to prepare the students to communicate effectively and to use the techniques, skills, and modern engineering tools necessary for engineering practice
- To prepare for understanding operations of CNC machines
- To prapare for assembling different componenets in engineering division
- To prepare for carpenter working tools handling
- To prepare students for handling the tools in engineering and furnace division

Course Outcomes

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

1. Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.
2. Students will be able to fabricate components with their own hands.
3. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
4. By assembling different components, they will be able to produce small devices of their interest.
5. Acquire knowledge of various different tools handling in engineering division
6. Knowledge gathering in casting and welding process too

PART – A (MECHANICAL)

1. WELDING

i. Preparation of arc welding of butt joints, lap joints and tee joints.

2. BASIC MACHINING

i. Simple Turning and Taper turning
ii. Drilling and Tapping
iii. Sheet Metal Work
iv. Model making – Trays, funnels, etc.

3. DEMONSTRATION ON

i. Smithy operations
ii. Foundry operations
iii. Plumbing Works
iv. Carpentary Works

PART –B (ELECTRICAL & ELECTRONICS)

4. ELECTRICAL ENGINEERING

i. Study of electrical symbols and electrical equipments.

ii. Construct the wiring diagram for Stair case wiring
iii. Construct the wiring diagram for Residential house wiring using switches, fuse, indicator, lamp and energy meter.
iv. Measurement of electrical quantities – voltage, current, power & power factor in R load.
v. Measurement of energy using single phase energy meter.

5. ELECTRONICS ENGINEERING

i. Study of Electronic components– Resistor (color coding), capacitors and inductors.
ii. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
iii. Study of logic gates AND, OR, NOT, NOR and NAND.

TOTAL : 5 HRS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Jeyachandran, K. and Balasubramanian, S	A Premier on Engineering Practices Laboratory	Anuradha Publications, Kumbakonam	2007
2	Jeyapoovan, T., Saravanapandian, M	Engineering Practices Lab Manual	VikasPuplishing House Pvt. Ltd, Chennai	2006
3	Bawa, H.S	Workshop Practice	Tata McGraw – Hill Publishing Company Limited, New Delhi	2007

SEMESTER I &II

17BECE213 BUILDING PLANNING AND DRAWING LABORATORY –CADD
0 0 3 2 100

COURSE OBJECTIVES

1. To understand the principles of planning and bylaws
2. To draw plan, elevation and section of load bearing and framed structures
3. To draw plan, elevation and section of public and industrial structures
4. To prepare detailed working drawing for doors, windows, etc.
5. To draw the Sectional views.
6. To prepare Blue print

COURSE OUTCOME

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

1. Apply the principles of planning and bylaws used for building planning.
2. Draw plan, elevation and section for various structures.
3. Draw plan, elevation and section of public and industrial structures
4. Detailed working drawing for doors, windows, etc.
5. Draw the Sectional views.
6. Prepare Blue print

DRAWING MANUALLY BY CONVENTIONAL METHODS

1. Conventional signs
2. Bonds in brick and stone masonry
3. Plan, elevation and section of simple buildings.

COMPUTER AIDED DRAWING

1. Buildings with load bearing walls (Flat and pitched roof) – Including details of doors and windows
2. Detailed drawings of floor plans, Elevations and Sections to show various features in a Building
3. Preparation of plot plans with study of property lines and Location of Buildings on site
4. RCC framed structures
5. Industrial buildings – North light roof structures – Trusses
6. Perspective view of one and two storey buildings

- **TEXT BOOKS**

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Building Drawing	Shah, Kale and Patki	Tata McGraw-Hill Co. Ltd,New Delhi	2004

- **REFERENCES**

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Building planning & Drawing	Dr.N. Kumaraswamy, A. KameswaraRao	Charotar Publishing,Gijarat	2007
2	Civil Engineering. Drawing & House Planning	B.P. Verma	Khanna Publishers, Delhi	2013

-

WEBSITES:

- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/
- http://icevirtuallibrary.com/
- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

VALUE ADDED COURSE

17BECE251 BUSINESS PLAN 1 0 0 - 100

Course Objectives

- To explain relevance of Ethics while taking business decisions.
- To get knowledge of Entrepreneurship
- To get knowledge of business plan process
- To get knowledge of business plan components
- To learn about management and organization
- To study about government policy

Course Outcomes

- Todevelop a business plan connected with ethics.
- To become Entrepreneur
- To analysis business plan process
- To analysis business plan components
- To build up management and organization plan
- To implement government policy

Unit I

Entrepreneurship – Types- Entrepreneurial Competencies -Business Plan – Meaning - Basic parameters - Project parameters - Factors of successful business - Term Loans and Working Capital Management.

Unit II

Business Plan Process - Sources of Information – Online Resources - Offline Resources - Sources of Market Research - Benefits of market study - Coverage of market study.

Unit III

Business Plan components - Company description - Industry Analysis - Target Market - Competition - Strategic position - Risk assessment - Technology plan - Management and Organization – Government policy

Reference books:

1. Rhonda Abrams " The Successful business Plan Secret $ Strategies " Prentice Hall
2. Rhonda Abrams “The business plan in a day" Prentice Hall.
3. Business plan preparation - Entrepreneurship Development Institute of India

SEMESTER III

SEMESTER III

17BECE301METHODS OF APPLIED MATHEMATICS 3 2 0 4 100

OBJECTIVES:

1. To make the student understand the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.
2. To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems and also to acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
3. Some standard functions and some of the properties of the Fourier transform.
4. Study Partial Differential equations in gravitation, electromagnetism, perfect fluids, elasticity, heat transfer and quantum mechanics.
5. To develop the use of Z - Transform techniques which is needed by Engineers for practical applications.
6. To solve various types of partial differential equations.

COURSE OUTCOMES:

1. Apply Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.
2. To solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
3. To be able to solve equations using Fourier transform
4. Better understanding in problems related to heat condition, communication systems, electro optics and electromagnetic theory using the techniques will be learnt in this course.
5. To solve problems using Z -Transform techniques for discrete time systems.
6. Apply the concept of Laplace, Fourier, Z- Transforms, Fourier Series and Applications of Partial Differential Equations in Engineering field.

UNIT I LAPLACE TRANSFORM (13)

Transforms of elementary functions – Basic properties – Transforms of derivatives and integrals – Initial and final value theorems. Inverse Laplace transforms – Convolution theorem (statement only) – Solution of Ordinary Differential Equations with constant coefficients using Laplace transforms – Transform of periodic functions.

UNIT II FOURIER SERIES (12)

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

UNIT III FOURIER TRANSFORM (12)

Fourier integral theorem (Statement Only) – Fourier transform pair –Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity – Relation between Fourier and Laplace transforms

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS (12)

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded)

UNIT V Z -TRANSFORM AND DIFFERENCE EQUATIONS (11)

Z-transform - Elementary properties – Inverse Z- transform – Convolution theorem -Formation of difference equations – Solution of difference equations using Z - transform.

TOTAL : 60 HRS

TEXT BOOKS:

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2013
2	Erwin Kreyszig	Advanced Engineering Mathematics.	Wiley India (P) Ltd, New Delhi.	2014

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Venkateswarlu S	Engineering Mathematics, Vol I	Anuratha Agencies and Publishers, Kumbakonam.	2007
2	Narayanan, S., Manicavachagom Pillay, T.K. and Ramaniah, G	Advanced Mathematics for Engineering Students. Volumes II and III,	Viswanathan S Printers and Publishers Pvt. Ltd. Chennai.	2002
3	Bali N P., Manish Goyal	A text book of Engineering Mathematics	Laxmi Publications Pvt. Ltd., New Delhi	2006
4	Ramana B V	Higher Engineering Mathematics	Tata McGraw Hill Publishing Co. Ltd. New Delhi.	2008

WEBSITES:

1. www.sosmath.com
2. http://mathworld.wolfram.com/FourierSeries.html
3. www. nptel.ac.in

SEMESTER-III

17BECE302A CONSTRUCTION MATERIALS, EQUIPMENTS AND GEOLOGY 3 0 0 3 100

OBJECTIVES:

1. To understand the importance of geological knowledge such as earth, earthquake, volcanism and to apply this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor as well as to choose types of foundations.
2. Identify the main and most common igneous, sedimentary and metamorphic rocks encountered by foundations and construction.
3. Analyze geological parameters important in geotechnical studies.
4. To establish and describe topographical and geological sections,
5. Identify potential geological hazards and various structures and ways of preventing and dealing with them
6. To collect, analyze, and report geologic data using standards in engineeringpractice

OUTCOMES:

1. Will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.
2. Will realize the importance of this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor
3. Can choose the types of foundations and other related aspects.
4. Students are able to know the engineering properties of rocks and geological structures of outer surface which help in construction of dam, bridge, building etc.
5. Students will gain the knowledge of different materials used in construction.
6. To gain the knowledge of manufacturing of different construction materials.
7. To gain the applications of materials in various fields.

UNIT– I: STONES, BRICKS, CONCRETE BLOCKS 9

Stone as building material – criteria for selection – test on stones – Deterioration and preservation of stone work – Bricks – classification and types– Tests on bricks – Bricks for special use – Refractory bricks – Concrete hollow blocks.

UNIT– II: CEMENT, AGGREGATE AND SAND 9

Cement – Ingredients – Manufacturing processes – Types and grades – Properties – Hydration-applicationsAggregate – Natural stone aggregate – crushing strength – Impact strength – Flakiness – abrasion - Sand – bulking – codes of practice -Mortar and concrete – Ingredients- types – manufacturing, Batching Plants

UNIT– III: TIMBER, STEEL, PAINTS AND OTHER MODERN MATERIALS. 9

Timber –Market forms –Industrial timber– Plywood, Veneer, laminates.Steel, Aluminum & other materials – composition– uses – market forms– Mechanical treatment.Paints, varnishes, distempers.Glass– ceramic– sealants for joints – fiber glass reinforced plastic– clay products– glass refractoriness.

UNIT IV: CONSTRUCTION EQUIPMENT 9

Selection of equipment for earth work - earth moving operations - types of earthwork equipment - tractors, motor graders, scrapers, front end waders, earth movers – Equipment for foundation and pile

driving. Equipment for compaction, batching and mixing and concreting - Equipment for material handling and erection of structures - Equipment for dredging, trenching, tunneling, drilling, blasting — dewatering and pumping equipment – Transporters.

UNIT-V: GENERAL GEOLOGY, STRUCTURAL GEOLOGY & THEIR SIGNIFICANCE.9

Geology in civil engineering– Earth processes– weathering– geological work of river, wind and sea– seismic activity– seismic zones in India – ground water.Structural geology –study of structures – dip and strike – fold, faults and joints – Their significance.

TOTAL: 45HRS

TEXT BOOKS:

S.No.	Title of the book	Author of the book	Publisher	Year of publication
1.	Engineering materials	Dr. R.K. Bansal	Lakshmi publications Pvt. Ltd., New Delhi	2010
2.	Construction Planning, Equipment and Methods	Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C.,	McGraw Hill, Singapore,	1995
3.	Engineering and General Geology	Parbin Singh	S.K.Kataria& sons, New Delhi	2011

REFERENCE BOOKS:

S.No.	Title of the book	Author of the book	Publisher	Year of publication
1.	Building construction	S.C. Rangwala	Charotar Publishing Company, Anand-388 001	2009
2.	Geology and Engineering	Legeet	McGraw-Hill Book company, Newyork	2004
3.	Engineering materials	Dr. R.K. Rajput	S. Chand & Company Ltd., New Delhi	2000

WEBSITES

- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
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- http://www.engineering-software.com/ce/
- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
-

SEMESTER III

17BECE302B CONCRETE TECHNOLOGY 3 0 0 3 100

OBJECTIVES:

1. To understand the properties of ingredients of concrete
2. To study the behavior of concrete at its fresh and hardened state
3. To study about the concrete design mix
4. To know about the procedures in concreting
5. To understand special concrete and their use
6. To know recent advancements in Concrete Technology.

COURSE OUTCOMES

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

1. Test all the concrete materials as per IS code.
2. Design the concrete mix using ACI and IS code methods.
3. Will Determine the properties of fresh and hardened of concrete.
4. To Design special concretes and their specific applications.
5. Ensure quality control while testing/ sampling and acceptance criteria.
6. Recent advancements in the field of concrete Technology.

UNIT I **9**

CEMENT& ADMIXTURES: Types – chemical composition – Hydration, Setting of cement – Structure of hydrate cement – Test on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures.

UNIT – II **9**

AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

UNIT – III **9**

FRESHCONCRETE: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.

UNIT IV **9**

HARDENED CONCRETE: Water / Cement ratio – Abram's Law – Gelspaoe ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength - Curing.

TESTING OF HARDENED CONCRETE: Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Non-destructive testing methods – codal provisions for NDT.

UNIT V **9**

MIX DESIGN: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – BIS method of mix design.

SPECIAL CONCRETES: Light weight concrete – Cellular concrete – No-fines concrete – High Strength concrete-High performance concrete- High density concrete – Fibre reinforced concrete - Polymer concrete – Properties – Applications — Self compacting concrete

TOTAL:45HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Concrete Technology	M.S.Shetty	S.Chand& Co, Uttar Pradesh	2004

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Concrete Technology	M.L. Gambhir	Tata Mc. Graw Hill Publishers, New Delhi	2004
2	Properties of Concrete	A.M.Neville	Canadian GovtPublishing Centre, Ottawa	2011
3	Concrete Technology	A.R.Santha Kumar	Oxford university Press, New Delhi	2006

WEBSITES:

- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/
- http://icevirtuallibrary.com/
- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

SEMESTER-III

17BECE303ENGINEERING MECHANICS 3 0 0 3 100

OBJECTIVES:

1. To provide an introductory treatment of *Engineering Mechanics* to all the students of engineering, with a view to prepare a good foundation for taking up advanced courses in the area in the subsequent semesters.
2. A working knowledge of statics with emphasis on force equilibrium and free body diagrams.
3. Provides an understanding of the kinds of stress and deformation and how to determine them in a wide range of simple, practical structural problems.
4. To understanding of the mechanical behavior of materials under various load conditions.
5. To apply Newton's laws ofmotion in practical experiences.
6. To apply basic knowledge of maths and physics to solve real-worldproblems

COURSE OUTCOME:

1. Ability to explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration.
2. Ability to analyses the forces in any structures.
3. Ability to solve rigid body subjected to dynamic forces.
4. Analyses the forces in any structures.
5. Solve rigid body subjected to dynamic forces.
6. Gain basic knowledge about the forces and moments.

UNIT – I **9**

STATICS OF PARTICLES: Forces in plane and space - Vector addition of concurrent forces in plane and space-Problems involving the equilibrium of a particle - Free body diagram - Equilibrium of particle in space.

UNIT – II **9**

STATICS OF RIGID BODIES IN TWO DIMENSIONS: Rigid bodies -Two dimensional structure - Moment of force about a point and about an axis - Moment of a couple - Equivalent systems of coplanar forces - Rigid body in equilibrium - Problems involving equilibrium of rigid body

Application of Statics: Types of supports - Reactions of beams and rigid frames

UNIT – III **9**

FRICTION: Laws of friction - Coefficient of friction - Problems involving dry friction - Wedge & ladder friction.

Introduction To Vibration: Simple Harmonic Motion - Mass spring system-Free vibration(elementary treatment only)

UNIT – IV **9**

KINEMATICS OF PARTICLES: Introduction - Plane, Rectilinear motion -Time dependent motion- Rectangular coordinates - Projectile motion.

Kinetics of Particles: Equation of motion - Rectilinear motion - Work energy method - Potential energy - Kinetic energy - Conservation of energy.

UNIT – V **9**

IMPULSE &MOMENTUM: Impulse - momentum principle - Concept of conservation of momentum - Impact-Direct central impact- Oblique central impact

TOTAL: 45HRS

TEXT BOOKS:

S.No	Title of the Book	Author of the Book	Publisher	Year of Publishing
1	Engineering Mechanics- Statics and Dynamics	Kottiswaran N	Sri Balaji Publications	2010

REFERENCE BOOKS:

S.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Engineering Mechanics	BhavikattiSS&Rajasekarappa KG	New Age International (P) Ltd., New Delhi	2008
2	Engineering Mechanics	Bansal R K	Laxmi Publications (P), New Delhi.	2007
3	Engineering Mechanics- Statics and Dynamics	RajasekaranS and Sankarasubramanian G	Vikas Publishing House Pvt. Ltd, New Delhi.	2005
4	Engineering Mechanics- Statics and Dynamics	Natesan S.C	Umesh Publications, New Delhi	2002

WEBSITES

- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/
- http://icevirtuallibrary.com/
- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

SEMESTER III

17BECE304 TRANSPORTATION ENGINEERING 3 0 0 3 100

OBJECTIVES:

1. To understand the importance of transportation and characteristics of road transport
2. To know about the history of highway development, surveys and classification of roads
3. To study about the geometric design of highways
4. To study about traffic characteristics and design of intersections
5. To know about the pavement materials and design
6. To gain the knowledge of horizontal and vertical curves.

COURSE OUTCOMES

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

1. Carry out surveys involved in planning and highway alignment.
2. Design cross section elements, sight distance, horizontal and vertical alignment.
3. Implement traffic studies, traffic regulations and control, and intersection design.
4. Determine the characteristics of pavement materials.
5. Design flexible and rigid pavements as per IRC.
6. Will gain the knowledge of horizontal and vertical curves.

UNIT I **9**

CLASSIFICATION OF ROADS-Highway alignment and surveys-Highway economics and financing.

Geometric design of High way-design speed-Cross sectional elements-super elevation-sight distances-Gradients-extra widening at curves.

UNIT II **9**

HIGHWAY MATERIALS-Aggregates and Bituminous Materials-Selection and testing-Construction methods for Earth roads,gravel,W.B.M, roads, Bituminous pavements and Cement concrete pavements

UNIT III **9**

TRAFFIC ENGINEERING-Traffic volume-Speed and delay studies-Parking and accident studies-Traffic signs, marking and signals-road intersections-Traffic forecasting-Need-limitation-Types of traffic-Forecasts of traffic. Traffic Compositions-Future traffic estimates-Design Vehicle-Dimensions-Types of Design Vehicles.

UNIT IV **9**

NATURE OF TRAFFIC PROBLEMS IN CITIES: Growth of towns-Growth of Traffic-Nature of Present Difficulties-Measures to meet problems-Need for Study-Land use and City Planning Controls-Restrain measures-Public transport-Promotion of public transport pedestriauisation-Staggy traffic hours.

Traffic and free environment-Effects of traffic on the environment-Noise-Air-Vibration-Degrading the aesthetic-Land consumption-Evaluation procedures-Environmental areas-computer application in traffic engineering-Public transport systems-Simulation, Traffic Planning and Computer application-situation in India.

UNIT V **9**

AIRPORTS-their importance-spacing and position in relation to their zone-details of their location and layout-auxiliary and terminal buildings-their location and layout.

Runway lighting and drainage-Other accessories such as hangers and repair yards-airport zoning.

TOTAL: 45HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Highway Engineering	C.E.G.Justo and S.K. Khanna	New Chand &Bros.,Roorkee	2000
2	Highway Engineering	Rangwala	CharotarPublications,Pune	2002

REFERENCE BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Highway Engineering	L.Kadiyali	Nath Market, Naisarak Delhi-110 006	2002
2	Highway Engineering	Paul K Wright and Karen K. Dixon	Replica Press Limited, Kundli, Seventh Edition	2009
3	Transportation Engineering & Planning,	C.S. Papacostas, P.D.Prevedouros	Prentice Hall of India, Third Edition, New York	2001

WEBSITES:

- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
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- http://icevirtuallibrary.com/
- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

SEMESTER-III

17BECE305 MECHANICS OF FLUIDS 3 0 0 3 100

OBJECTIVES:

1. To understand the properties of fluids and fluid statics.
2. To solve kinematic problems such as finding particle paths and stream lines.
3. To use important concepts of continuity equation, Bernoulli's equation and turbulence, and apply the same to problems.
4. To study about specific speed and performance characteristics of different types of turbines.
5. To study types of centrifugal Pumps, work done and efficiency of the different types centrifugal pumps and also study about performance of pumps & characteristic curves.
6. To identification of type of turbine with estimated specific speed.

COURSE OUTCOMES

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

1. Understand the basic principles of fluid mechanics.
2. Understand the concepts of statics and dynamics of fluid flow.
3. Develop skills in analyzing fluid flows through the proper use of modeling and the application of the basic fluid-flow principles.
4. Acquire knowledge in the selection of type of turbine required with reference to available head of water
5. Identification of type of turbine with estimated specific speed.
6. Capable of estimating efficiency of different pumps and performance of the pumps with the study of characteristics curves.

UNIT I **9**

TYPES AND PROPERTIES OF FLUIDS: Introduction– Types of fluids- Basic properties – calculation of Viscosity, compressibility, surface tension.

Fluid statics:

Fluid pressure-various methods of measurement. Total pressure and centre of pressure – determination on plane surface only – Equilibrium of floating bodies – conditions and analysis.

UNIT II **9**

KINEMATICS OF FLUID FLOW: Classification of fluid flow – stream function and velocity potential – (Reynolds number and its application) - Linear acceleration and constant rotation of fluids in a container – application and simple problems.

UNIT III **9**

DYNAMICS OF FLUID FLOW: Euler's equation of motion – Bernoulli's theorem – Limitation of Bernoulli's theorem – Application – simple problems. Venturimeter – Flow nozzle meter – Bend meter – Pitot tube – current meter.

UNIT IV **9**

FLOW THROUGH PIPES: Laminar and Turbulent flow – friction and minor losses (Study of Moody's diagram).Transmission of power through pipes – flow between reservoirs – parallel, series and siphon pipes – water hammer.

UNIT V **9**

DIMENSIONAL AND MODEL ANALYSIS

Dimensional Homogeneity – Need – Rayleigh's method &Buckingham's Pi theorem – Significance of dimensionless numbers-Reynolds number, Froude number, Euler's number, Mach number and Weber number – Distorted models – Scale effect

TOTAL: 45HRS

TEXT BOOKS:

S.No	Title of the Book	Author of the Book	Publisher	Year of Publishing
1	Text book of Fluid Mechanics and Hydraulic Machines	Bansal. R.K	Lakshmi Publications, Madras	2005

REFERENCES:

S.No	Title of the Book	Author of the Book	Publisher	Year of Publishing
1	Fluid Mechanics & Hydraulic Machines	R K Rajput	M/s.S.Chand Co., Madras	2008
2	Fluid Mechanics, Hydraulics & Fluid Machinery	Ramamrutham.S	M/s.Dhanpatrai& Sons, New Delhi	2006
3	Fluid Mechanics, Hydraulics and Hydraulic machines	Arora K.R	Standard Publishers Distributors, New Delhi	2011

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- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/

SEMESTER-III

17BECE306 SURVEYING I 3 0 0 3 100

OBJECTIVES:

1. Chain, Compass, Plane table and Theodolite surveying. Leveling, Engineering surveys.
2. Skill to carry survey and to decide appropriate type of execution in construction works.
3. Numerical solutions for carrying out surveying in civil engineering field. Advanced surveying equipment's.
4. Work with survey observations, and performcalculations,
5. To Provides independent knowledge for carrying out individual projects.
6. To know the different surveys used in civil field.

COURSE OUTCOMES

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

1. Understand the basic need for surveying
2. Explore the different surveying instruments for surveying.
3. Describe the methods of measurement using level instrument and theodolite.
4. Provides independent knowledge for carrying out individual projects.
5. Will gain the knowledge of L.S and C.S
6. Able to know the different surveys used in civil field.

UNIT I **9**

INTRODUCTION -Definition , Principles and Classification of surveying- Field work and office work - Scales - Conventional signs - Survey instruments, their care and adjustment –chain surveying- Ranging - Reciprocal ranging - Setting perpendiculars – well-conditioned triangles - Traversing - Plotting - Enlarging and reducing figures.

UNIT II **9**

COMPASS SURVEYING AND PLANE TABLE SURVEYING : Prismatic compass - Surveyor's compass - Bearing - Systems and conversions - Local attraction - Magnetic declination - Dip - Traversing - Plotting - Adjustment of errors - Plane table instruments and accessories –Merits and demerits - Methods - Radiation - Intersection - Resection – Traversing- Two point and three point problem.

UNIT III **9**

LEVELLING AND APPLICATIONS: Level line - Horizontal line - Levels and Staves - Spirit level - Sensitiveness - Bench marks - Temporary and permanent adjustments - Fly and check levelling - Booking - Reduction - Curvature and refraction - Reciprocal levelling - Longitudinal and cross sections - Plotting - Calculation of areas and volumes - Contouring - Methods - Characteristics and uses of contours - Plotting - Earth work volume - Capacity of reservoirs.

UNIT IV **9**

THEODOLITE SURVEYING: Theodolite - Vernier and microptic - Description and uses - Temporary and permanent adjustments of vernier transit - Horizontal angles - Vertical angles - Heights and distances - Traversing - Closing error and distribution - Gale's tables - Omitted measurements.

UNIT V **9**

ENGINEERING SURVEYS **:**Reconnaissance, preliminary and location surveys for engineering projects - Lay out - Setting out works - Route Surveys for highways, railways and waterways - Curve ranging - Horizontal and vertical curves - Simple and reverse curves - Setting with chain and tapes, tangential angles by theodolite, double theodolite - Transition curves - Functions and requirements

TOTAL: 45HRS

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Surveying&levelling	N.N.Basak	Tata McGraw Hill	2011
2	Surveyingvol I	Dr.B.C.Punmia	Laxmi Publications	2011

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Plane and Geodetic Surveying, Vols. I and II	Aylmer Johnson	CRC Press	2004
2	Introduction to Surveying	James M.Anderson and Edward M.Mikhail	McGraw-Hill Book Company,New Delhi.	2005

WEBSITES:

- http://www.icivilengineer.com
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- http://www.aboutcivil.com/
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- http://www.engineering-software.com/ce/

SEMESTER-III

17BECE311 CONSTRUCTION MATERIALS LABORATORY & ORIENTED PROJECTS

0 0 3 2 100

OBJECTIVES:

1. To learn the Procedure and Purpose of carrying out various tests on properties of materials used for construction.

COURSE OUTCOMES

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

1. Understand the basic building materials to be used in construction work
2. Know the various construction practices in the field and the different construction equipment's used in the field
3. Make aware of the various construction techniques, practices and the equipment needed for different types of construction activities.

TEST ON MATERIALS

1. ORDINARY PORTLAND CEMENT:

Determination of the specific gravity of cement using Le-chaletier flask and the fineness by sieve analysis.

- Determination of the normal consistency and setting times.
- Determination of the soundness of OPC using Le-chaletier apparatus.
- Determination of the compressive strength of Ordinary Portland cement.

2. TEST ON AGGREGATE:

Determination of the Specific gravity, Bulk density and Water Absorption of Aggregates.

- Study of the phenomenon of Bulking of sand – River Sand and M Sand
- Determination of fineness modulus for fine and coarse aggregates by drawing grading curves
  - River Sand and M Sand.
- Determination of the impurities in aggregates.

3. TEST ON BRICKS:

- Determination of the compressive strength.

- Determination of the water Absorption.
- Determination of the degree of efflorescence.
- Checking of dimensional tolerance and warpage.

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REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Building Construction, Planning Techniques and Method of Construction	Arora S.P. and BindraS.P	DhanpatRai and Sons, New Delhi	2008
2	Construction Planning,Equipment and Methods	Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C	5th Edition, McGraw Hill, Singapore,	2004

CODE BOOKS

1. **IS 269 for 33 Grade cement**
2. **IS 8112 for 43 Grade Cement**
3. **IS 12269 for 53 Grade Cement**
4. **IS 383 for Testing of Aggregates**

SEMESTER-III

17BECE312 SURVEYING PRACTICAL I 0 0 3 2 100

OBJECTIVES:

1. Introduction to Chain Surveying
2. Traverse using Compass Surveying.
3. Plane Table Surveying – Radiation, intersection, Traverse, Resection,Leveling.
4. Tachometry and Theodolite survey trigonometric leveling to determine heights/elevations.
5. Total Station.
6. Setting out of curves (horizontal and vertical)

COURSE OUTCOMES

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

1. Use conventional surveying tools such as chain/tape, compass, plane table, level in the field of civil engineering applications such as structural plotting and highway profiling.
2. Apply the procedures involved in field work and to work as a surveying team.
3. Plan a survey appropriately with the skill to understand the surroundings. Take accurate measurements, field booking, plotting and adjustment of errors can be understood.
4. Traverse using Compass Surveying.
5. Plane Table Surveying – Radiation, intersection, Traverse, Resection,Leveling.
6. Setting out of curves (horizontal and vertical)

1. Study of chains and its accessories
2. Aligning, Ranging and Chaining
3. Chain Traversing
4. Compass Traversing
5. Plane table surveying: Radiation
6. Plane table surveying: Intersection
7. Plane table surveying: Traversing
8. Plane table surveying: Resection –Three point problem
9. Plane table surveying: Resection – Two point problem
10. Study of levels and levelling staff
11. Fly levelling using Dumpy level
12. Check levelling
13. LS and CS
14. Study of Contouring

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Surveying	Bannister A. and Raymond S	ELBS, Seventh Edition, Canada	2004
2	Surveying and Levelling Part 1 &2 , 23rd edition,	Kanetkar.T.P. &S.V.Kulkarni,	Punavidyarthigriha ,Prakashan,	2008

VALUE ADDED COURSE

17BECE351 **SOFT SKILLS** **2 0 0 - 100**

OBJECTIVE

1. To elevate the students into productivity powerhouses who can employ life skills to better their performances

UNIT I **4**

Overview to communication, self-Introduction, Presentation on their own topic, Extempore, Group Activity

UNIT II **3**

Group Discussion, Do's and Don’ts of Group Discussion, Body language, Grooming and Resume, Resume correction

UNIT III **4**

Introduction to HRM – Questions - Do's and Don’t's - Interview - Mock GD - Stress Management

UNIT IV **4**

Personality Development - Presentation skills, Interpersonal skills, Critical thinking, Confidence building and Stress management.

TOTAL: 15 HRS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Barun K Mitra	Personality Development and Soft Skills	Oxford University Press-New Delhi	2012
2	Rajiv K. Mishra	Personality Development	Rupa& Co.	2012

SEMESTER IV

SEMESTER-IV

17BECE401A CONSTRUCTION MATERIALS, EQUIPMENTS AND GEOLOGY 3 0 0 3 100

OBJECTIVES:

1. To understand the importance of geological knowledge such as earth, earthquake, volcanism and to apply this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor as well as to choose types of foundations.
2. Will realize the importance of this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor
3. To choose the types of foundations and other related aspects.
4. To gain the engineering properties of rocks and geological structures of outer surface which help in construction of dam, bridge, building etc.
5. To gain the knowledge of different materials used in construction.
6. To gain the knowledge of manufacturing of different construction materials

COURSE OUTCOMES

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

1. Will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.
2. Will realize the importance of this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor
3. Students are able to know the engineering properties of rocks and geological structures of outer surface which help in construction of dam, bridge, building etc.
4. Students will gain the knowledge of different materials used in construction.
5. To gain the knowledge of manufacturing of different construction materials.
6. To gain the applications of materials in various fields.

UNIT– ISTONES, BRICKS, CONCRETE BLOCKS 9

Stone as building material – criteria for selection – test on stones – Deterioration and preservation of stone work – Bricks – classification and types– Tests on bricks – Bricks for special use – Refractory bricks – Concrete hollow blocks.

UNIT– IICEMENT, AGGREGATE AND SAND 9

Cement – Ingredients – Manufacturing processes – Types and grades – Properties – Hydration- applications Aggregate – Natural stone aggregate – crushing strength – Impact strength – Flakiness – abrasion - Sand – bulking – codes of practice -Mortar and concrete – Ingredients- types – manufacturing, Batching Plants

UNIT– IIITIMBER, STEEL, PAINTS AND OTHER MODERN MATERIALS. 9

Timber –Market forms –Industrial timber– Plywood, Veneer, laminates. Steel, Aluminum & other materials – composition– uses – market forms– Mechanical treatment. Paints, varnishes, distempers. Glass– ceramic– sealants for joints – fiber glass reinforced plastic– clay products– glass refractoriness.

UNIT IVCONSTRUCTION EQUIPMENT 9

Selection of equipment for earth work - earth moving operations - types of earthwork equipment - tractors, motor graders, scrapers, front end waders, earth movers – Equipment for foundation and pile driving. Equipment for compaction, batching and mixing and concreting - Equipment for material handling and erection of structures - Equipment for dredging, trenching, tunneling, drilling, blasting — dewatering and pumping equipment – Transporters.

UNIT– V GENERAL GEOLOGY, STRUCTURAL GEOLOGY & THEIR SIGNIFICANCE. **9**

Geology in civil engineering– Earth processes– weathering– geological work of river, wind and sea– seismic activity– seismic zones in India – ground water.Structural geology –study of structures – dip and strike – fold, faults and joints – Their significance.

TOTAL: 45HRS

TEXT BOOKS:

S.No.	Title of the book	Author of the book	Publisher	Year of publication
1.	Engineering materials	Dr. R.K. Bansal	Lakshmi publications Pvt. Ltd., New Delhi	2010
2.	Construction Planning, Equipment and Methods	Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C.,	McGraw Hill, Singapore,	1995
3.	Engineering and General Geology	Parbin Singh	S.K.Kataria& sons, New Delhi	2011

REFERENCE BOOKS:

S.No.	Title of the book	Author of the book	Publisher	Year of publication
1.	Building construction	S.C. Rangwala	Charotar Publishing Company, Anand-388 001	2009
2.	Geology and Engineering	Legeet	McGraw-Hill Book company, Newyork	2004
3.	Engineering materials	Dr. R.K. Rajput	S. Chand & Company Ltd., New Delhi	2000

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- http://www.engineering-software.com/ce/

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- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/

SEMESTER IV

17BECE401B CONCRETE TECHNOLOGY 3 0 0 3 100

OBJECTIVES:

1. To understand the properties of ingredients of concrete
2. To study the behavior of concrete at its fresh and hardened state
3. To study about the concrete design mix
4. To know about the procedures in concreting
5. To understand special concrete and their use.
6. To know recent advancements in Concrete Technology.

COURSE OUTCOMES

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

1. Test all the concrete materials as per IS code.
2. Design the concrete mix using ACI and IS code methods.
3. Determine the properties of fresh and hardened of concrete.
4. Design special concretes and their specific applications.
5. Ensure quality control while testing/ sampling and acceptance criteria.
6. Will gain the knowledge of admixtures used.

UNIT I **9**

CEMENT& ADMIXTURES: Types – chemical composition – Hydration, Setting of cement – Structure of hydrate cement – Test on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures.

UNIT – II **9**

AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

UNIT – III **9**

FRESHCONCRETE: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.

UNIT IV **9**

HARDENED CONCRETE: Water / Cement ratio – Abram's Law – Gelspaoe ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting

strength – Relation between compression & tensile strength - Curing.

TESTING OF HARDENED CONCRETE: Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Non-destructive testing methods – codal provisions for NDT.

UNIT V **9**

MIX DESIGN: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – BIS method of mix design.

SPECIAL CONCRETES: Light weight concrete – Cellular concrete – No-fines concrete – High Strength concrete-High performance concrete- High density concrete – Fibre reinforced concrete - Polymer concrete – Properties – Applications — Self compacting concrete

TOTAL:45HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Concrete Technology	M.S.Shetty	S.Chand& Co, Uttar Pradesh	2004

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Concrete Technology	M.L. Gambhir	Tata Mc. Graw Hill Publishers, New Delhi	2004
2	Properties of Concrete	A.M.Neville	Canadian GovtPublishing Centre, Ottawa	2011
3	Concrete Technology	A.R.Santha Kumar	Oxford university Press, New Delhi	2006

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- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

SEMESTER-IV

17BECE402 SOLID MECHANICS I 3 0 0 3 100

OBJECTIVES:

1. To impart to the students the concepts of stresses and strains and Hooke's law.
2. To enlighten the students about different types of truss analysis.
3. To teach the students about the beam analysis
4. To teach about thin cylindrical and spherical shell analysis when subjected to internal pressure
5. To impart ideas of torsional stresses and how to evaluate it in circular sections and its applications in spring analysis.
6. To gain the brief knowledge in the applications in spring analysis

COURSE OUTCOMES

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

1. The concepts of stresses, strains and Hooke's law.
2. Different types of truss analysis, beam behavior and analysis.
3. Thin cylindrical and spherical shell analysis when subjected to internal pressure.
4. Ideas of torsional stresses and how to evaluate it in circular sections
5. Will gain the brief knowledge in the applications in spring analysis.
6. Understand the different types of beams and their applications.

UNIT I **9**

SIMPLE STRESSES AND STRAINS-Hooke's Law-Principle of superposition-Composite Sections-Temperature Stress-Hoop Stress-Elastic Constants-Principal Stresses and Strains-Mohr's Circle-Strain Energy and impact loading-Stresses due to gradual, sudden and impact loading-Proof resilience-Shear resilience.

UNIT II **9**

GEOMETRICAL PROPERTIES OF SECTIONS-Centroid-Centre of mass-Centre of gravity-Moment of inertia-Area moment of inertia-Mass Moment of inertia-Rectangular moment of inertia-Polar moments of inertia-Radius of gyration of an area-Perpendicular axis theorem-Parallel axis theorem-Moment of inertia.

UNIT III **9**

BENDING OF BEAMS -Types of beams and loads - Theory of simple bending – B.M.D. and S.F.D for Cantilever, Simply Supported and Overhanging beams subjected to various types of loading –UDL, Point Load, UVL- point of contraflexure- Calculation of shear stress and bending stress

UNIT IV **9**

DEFLECTION OF BEAMS-Slope and Deflection at a point- Estimation of slope and deflection for Cantilever, Simply Supported and Overhanging beams subjected to various types of loading (Only application of formulae) -Mohr's theorem-Strain energy method.

UNIT V **9**

TORSION OF SHAFTS-Assumptions-horse power transmitted by a shaft-Strength of solid shaft, Hollow shafts, composite shafts & stepped shafts -Torsional strain energy.

Spring-Leaf spring-Helical springs-Strain energy stored in a spring.

TOTAL: 45HRS

TEXT BOOKS:

S.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Strength of Materials	S.Ramamrutham	DhanpatRai Publishing Company, New Delhi	2012

REFERENCE BOOKS:

S.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Strength of Materials and Theory of Structures Vol.I	Dr.B.C.Punima	Laxmi Publication, New Delhi	2013
2	Strength of Materials (Mechanics of Solids)	Rajput R.K	S.Chand& Company Ltd., New Delhi	2012
3	Strength of Materials (Mechanics of Solids)	Khurmi R.S.	S.Chand& Company Ltd., New Delhi	2012

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- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
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- http://www.asce.org/
- http://www.cif.org/
- http://icevirtuallibrary.com/
- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

SEMESTER-IV

17BECE403 APPLIED HYDRAULICS AND MACHINERY 3 0 0 3 100

OBJECTIVES:

1. To classify the types of flows in open channel and also to design open channel sections in a most economical fashion with minimum wetted perimeter and learn about critical flows.
2. To study about non uniform flows in open channel and longitudinal slopes in open channel and also to learn about the characteristics of hydraulic jump.
3. To develop an understanding of fluid flow patterns and learn to use boundary layer theory and Drag.
4. To provide insights to the Open channel hydraulics and introduce dimensional analysis for fluid flow problems.
5. To understand hydraulic jump phenomenon
6. To analyzing fluid flows in open channel hydraulics and measurements such as weirs and flumes.

COURSE OUTCOMES

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

1. Acquire specific knowledge regarding fluid flow phenomena observed.
2. Understand the basic principles of fluid flow patterns and boundary layer theory
3. Develop skills in analyzing fluid flows in open channel hydraulics and measurements such as weirs and flumes.
4. Will gain knowledge about the Open channel flow.
5. Understand hydraulic jump phenomenon
6. Design open channels for rectangular and non-rectangular channels for GVF and RVF.

UNIT I UNIFORM FLOW IN OPEN CHANNELS: 9

Types of Channels - Uniform flow – chezy's equation – Manning's equation-hydraulically best section of rectangular, trapezoidal and circular sections – circular sections not running full-flow measurement using orifices, mouthpieces, notches and weirs.

UNIT IINON-UNIFORM FLOW IN OPEN CHANNELS 9

Introduction - Critical depth – Specific Energy – Characteristics of non uniform flow – Analysis of hydraulic Jump – Back water curves –venturiflume – Surges in channels.

UNIT III IMPACT OF JETS 9

Flow over immersed bodies: Drag and lift – stream lined Bluff bodies – Terminal velocity – Estimation of drags and lift forces. Impulse – Momentum principle – and its application – dynamic force upon a body in motion – Torque in rotating machines – jet propulsion.

UNIT IVPUMPS 9

Classification of pumps – Centrifugal pumps – Reciprocating Pumps – Deep well pumps – Airlift Pump – Working principle only – Characteristic curves – Selection of pumps and Simple problems.

UNIT V TURBINE **9**

Classifications – velocity triangles for turbines, work done and efficiency – study of pelton wheel, Francis and axial flow turbines – governing of turbines – characteristic curves – Specific speed – Model testing – Selection of turbines – Simple Problems to determine geometric dimensions.

TOTAL: 45HRS

TEXT BOOK:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	A Text book of Fluid Mechanics and Hydraulic Machines	Bansal.R.K	Lakshmi Publication, Madras	2012
2	Fluid Mechanics, Hydraulics & Fluid Machines	Ramamrutham. S	DhanpatRai& Sons, New Delhi	2013

REFERENCE BOOKS:

Sl. No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Applied Hydraulic Engineering	Dr P.N Chadramouli	Yes Dee Publication Pvt ltd	2017
2	Engineering Fluid Mechanics	Kumar.K.L	S. Chand Co., Madras	2012
3	Hydraulics, Fluid Mechanics & Hydraulic Machinery	Modi P.M, &Seth.S.M	Standard Book House, New Delhi	2008
4	Fluid Mechanics, Hydraulics and Hydraulic Machines	Arora, K.R	Standard Publishers Distributors, Delhi	2011

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- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/

SEMESTER-IV

17BECE404 MECHANICS OF SOIL 3 0 0 3 100

OBJECTIVES:

1. To explain what Geotechnical Engineering is and how it is important to civil engineering
2. To explain how three phase system is used in soil and how are soil properties estimated using three phase system
3. To explain role of water in soil behavior and how soil stresses, permeability and quantity of seepage including flow net are estimated
4. To determine shear parameters and stress changes in soil due to foundation loads
5. To estimate the magnitude and time-rate of settlement due to consolidation.
6. To Solve three phase system problems.

COURSE OUTCOMES

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

1. Carry out soil classification.
2. Solve three phase system problems.
3. Solve any practical problems related to soil stresses estimation,
4. Gain the knowledge in permeability and seepage including flow net diagram
5. Estimate the stresses under any system of foundation loads.
6. Solve practical problems related to consolidation settlement and time rate of settlement.

UNIT I BASIC PROPERTIES OF SOILS 9

Soil formation-Soil problems in Engineering –Physical properties of soil –Phase relations-Index properties of soil – Grain size distribution –Atterberg limits – classification of soils as per BIS – Fixed identification –simple tests

UNIT II STRESSES IN SOILS 9

Soil water statics – Concept of effective and neutral stresses – Capillary phenomenon –Vertical stress distribution in soil –Bossiness equation – Westerguards equation – Line load –uniformly distributed loads –New marks chart –construction and use –Pressure bulb .

UNIT III PERMEABILITY AND SEEPAGE 9

One dimensional flow through soil –permeability –Darcy's law –field and laboratory permeability tests –Flow through stratified soil –Seepage pressure quick sand condition-Two dimensional flow – Laplace equation –Electrical analogy –Flow net –Methods of construction –properties –Applications –sheet pile cut off and earth dam –Phreatic line.

UNIT IV CONSOLIDATION AND SETTLEMENT 9

Consolidation –consolidation settlement –Laboratory test -Determination of $C_v$by curve fitting methods –Terzaghi's one dimensional consolidation –Definition of terms –Normally consolidated clay –Over consolidated clay –Under consolidated clay –Field curve –Pre consolidation pressure –e

vs p curve –Boundary condition –Time Factor –Time of consolidation. –computation of rate of settlement – Types of Settlements – Components of settlements – Factors affecting settlements

UNIT V SHEAR STRENGTH **9**

Shear strength of soil –importance and use –Mohr –coloumbs' theory –Factors affecting the shear strength. –Laboratory test –Direct shear test –Tri-axial compression test –types of triaxial test based on drainage conditions –UCC test –Field test

TOTAL: 45HRS

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Soil mechanics and foundations	Punmia. B.C	Laxmi Publications pvt.Ltd,New Delhi	2012

REFERENCE BOOK:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Basic and Applied Soil Mechanics	GopalRanjan and Rao, A.S.R	Wiley eastern Ltd., New Delhi	2009
2	A Text Book of Soil Mechanics and Foundation Engineering.	V.N.S.Moorthy	Marcel Dekker,Inc, Newyork	2013
3	Soil Mechanics and Foundation Engineering	Arora.K.R	Standard Publishers and Distributors,New Delhi	2012

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- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
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- http://icevirtuallibrary.com/
- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

SEMESTER-IV

17BECE405 SURVEYING II 3 0 0 3 100

OBJECTIVES:

The student will be able to gain knowledge on

1. Skill to carry survey and to decide appropriate type of execution in construction works.
2. Numerical solutions for carrying out surveying in civil engineering field. Advanced surveying equipment's.
3. To provides independent knowledge for carrying out individual projects.
4. To identify and calculate the errors in measurements
5. To apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveyingactivities
6. To translate the knowledge gained for the implementation of Civil infrastructure facilities

COURSE OUTCOMES

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

1. Explore the different surveying instruments for surveying.
2. Describe the methods of measurement using level instrument and theodolite.
3. Provides independent knowledge for carrying out individual projects.
4. Able to identify and calculate the errors in measurements
5. Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveyingactivities
6. Translate the knowledge gained for the implementation of Civil infrastructure facilities

UINT-I **9**

TACHEOMETRIC SURVEYING: Tacheometric systems - Tangential, stadia and subtense methods - Stadia systems - Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs - Stadia constants - Analytic lens - Subtense bar.

UINT-II **9**

CONTROL SURVEYING: Working from whole to part - Horizontal and vertical control methods - Triangulation - Signals - Base line - Instruments and accessories - Corrections - Satellite station - Reduction to Centre – Trigonometric levelling - Single and reciprocal observations - Modern trends – Bench marking

UINT-III **9**

SURVEY ADJUSTMENTS: Errors - Sources, precautions and corrections - Classification of errors - True and most probable values - weighted observations - Method of equal shifts - Principle of least squares - Normal equation - Correlates - Level nets - Adjustment of simple triangulation networks.

UINT-IV **9**

REMOTE SENSING and GPS: Field of Applications –Natural Resources-Agriculture-Soil-Water Resources-Wasteland Management-Social resources-Cadastral Records-LIS
Basic concepts of GPS and its applications

UINT-V **9**

OTHER TOPICS: Fundamental principal:(Demo)Photogrammetry - Introduction - Terrestrial and aerial Photographs - Stereoscopy - Parallax –Introduction to Total Station- Electromagnetic distance measurement - Carrier waves - Principles - Instruments - Trilateration - Hydrographic Surveying - Tides - MSL - Sounding methods - Location of soundings and methods

TOTAL: 45HRS

TEXT BOOKS

S.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Surveying, Volume I, II and III	Punmia B.C	LaxmiPublications,Delhi	2012

REFERENCES

S.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Plane and Geodetic Surveying, Volume I and II	Aylmer Johnson	CRC Press , New York	2004
2	Introduction to Surveying	James M.Anderson and Edward M.Mikhail	McGraw-Hill Book Company, New York, Fifth Edition	2009
3	Elements of Cartography	Harley	McGraw-Hill Book Company New York, Fifth Edition	2001
4	Surveying and Levelling, Volume I and II	KanetkarT.P	United Book Corporation, Pune	2007
5	Surveying	Bannister A. and Raymond S	ELBS, Seventh Edition	2004
6	Surveying and Levelling	Basak.N.N	McGraw-Hill Book Company	2011

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SEMESTER-IV

17BECE411 GEOTECHNICAL LABORATORY 0 0 3 2 100

OBJECTIVES:

1. To estimate index properties of soils (coarse and fine).
2. To estimate consistency limit of fine grained soils.
3. To estimate shear strength of soils by direct shear test, triaxial shear test, vane shear test & unconfined compressive test.
4. To estimate the engineering properties of the soils by density test, CBR test
5. To estimate the engineering properties of permeability test and consolidation test.
6. To classify the soil by physical observation of soil.

COURSE OUTCOMES

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

1. Classify soil by physical observation of the soils.
2. Classify soil based on estimated index and engineering characteristics of soils.
3. Carry out interpolation among the estimated soil design parameters.
4. Estimate shear strength of soils by direct shear test, triaxial shear test, vane shear test & unconfined compressive test.
5. Estimate the engineering properties of the soils by density test, CBR test
6. Estimate the engineering properties of permeability test and consolidation test.

LIST OF EXPERIMENTS

1. Specific gravity of soil grains(Specific gravity bottle &Pycnometer)
2. Grain size distribution - Sieve analysis
3. Relative density of sands
4. Atterberg limits test

   a) Liquid Limit
   b) Plastic Limit
   c) Shrinkage Limit

- Determination of moisture - Density relationship using standard Proctor test.
- Permeability determination (constant head and falling head methods)
- Determination of shear strength parameters.

  a) Direct shear test on cohesion less soil
  b) Unconfined compression test on cohesive soil

c) Triaxial compression test (Study Experiment)

- One dimensional consolidation test (Determination of co-efficient of consolidation only, Study Experiment)

- Field density test

a) Core cutter and
b) Sand replacement methods

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Manual of Soil Laboratory Testing (Vol-1 to 3),	Head, K.H	John Wiley & Sons, Chichester	2009
2	Soil Testing for Engineers	LambeT.W	John Wiley and Sons, New York	2009
3	Measurement of Engineering Properties of Soils,	Saibaba Reddy, E. and Rama Sastri, K	New Age International Publishers, New Delhi	2002
4	I.S.Code of Practice (2720) Relevant Parts, as amended from time to time			

SEMESTER-IV

17BECE412 SURVEYING PRACTICAL II 0 0 3 2 100

OBJECTIVES:

The Lab sessions would include experiments on

1. Introduction to Chain Surveying
2. Traverse using Compass Surveying.
3. Plane Table Surveying – Radiation, intersection, Traverse, Resection, Leveling.
4. Tachometry and Theodolite survey trigonometric leveling to determine heights/elevations.
5. Total Station.
6. Setting out of curves (horizontal and vertical)

Course outcomes

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

1. Use conventional surveying tools such as chain/tape, compass, plane table, level in the field of civil engineering applications such as structural plotting and highway profiling.
2. Apply the procedures involved in field work and to work as a surveying team.
3. Plan a survey appropriately with the skill to understand the surroundings. Take accurate measurements, field booking, plotting and adjustment of errors can be understood.
4. Traverse using Compass Surveying.
5. Plane Table Surveying – Radiation, intersection, Traverse, Resection, Leveling.
6. Setting out of curves (horizontal and vertical)

1. Study of Theodolite, Total Station and GPS
2. Measurement of horizontal angles by reiteration and repetition and vertical angles
3. Heights and distances - Triangulation - Single plane method.
4. Tacheometry - Tangential system - Stadia system - Subtense bar.
5. Setting out works - Foundation marking - Simple curve (right/left-handed).
6. Distance, height and area measurements using total station
7. Horizontal curve setting using total station for roads

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Surveying	Bannister A. and Raymond S	ELBS, tenth Edition, Canada.	2008
2	"Surveying and Levelling Part 1 &2 ", 23rd edition,	Kanetkar.T.P. &S.V.Kulkarni,	Punavidyarthigriha,Prakashan,	2012

SEMESTER-IV

17BECE413 SCIENTIFIC COMPUTING LABORATORY 2 0 2 3 100

OBJECTIVES:

1. The objective of this course is to familiarize the students with statistical techniques.
2. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.
3. To introduce students to numerical methods used to solve engineering problems.
4. Fundamentals of numerical methods/algorithms to solve systems of different mathematical equations (e.g. linear/ non-linear algebraic equations, ordinary /partial differential equations), will be introduced.
5. The course would enable students to write their own computer programs using programming languages like C and software like Excel.
6. To understand procedure-oriented Excel concepts.

COURSE OUTCOMES:

1. To solve engineering problems involving Linear and non-linear equations.
2. Hands-on experience will be provided to apply these computer programs to solve problems in different areas of engineering.
3. To acquire skills in handling situations involving linear/ non-linear algebraic equations, ordinary /partial differential equations
4. To solving actual engineering problems through computer programming and coding.
5. To solve ordinary and partial differential equations using programming languages like C and software like Excel.
6. Student will understand procedure-oriented Excel concepts. Student will be capable of writing C and Excel programs efficiently.

LIST OF EXPERIMENTS

1. Finding solution of Transcendental equation
   - i) Newton – Raphson Method
   - ii) Bisection method
   - iii) Iterative method by reducing the equation to the form $x = f(x)$
2. Finding the dominant eigenvalue and eigenvector by power method
3. Numerical integration
   - i) Gauss 2 point and 3 point formulae
   - ii) Trapezoidal method
   - iii) Simpson's 1/3 rule
4. Solution of initial value problems governed by ODE
   - i) Runge - Kutta 4^{th} order method
   - ii) Modified Euler's method

iii) Milne's method
iv) Adam – Bashforth method

5. Solution of BVP governed by PDE
   i) Laplace Equation
   ii) One – dimensional heat equation
      a) Explicit method : Bender – Schmidt's method
      b) Implicit method : Crank - Nicolson's method
   iii) One dimensional wave equation
      Implicit method

REFERENCE BOOKS:

S. No.	**Author(s) Name**	**Title of the book**	**Publisher**	**Year of Publication**
1	Curtis F. Gerald and Patrick O. Wheatley	Applied Numerical Analysis	Pearson Education, South Asia	2009
2	Steven C. Chapra, Raymond P. Canale	Numerical Methods for Engineers	McGraw - Hill Pub. Co. Ltd	2014

SEMESTER-IV
VALUE ADDED COURSE

17BECE451 COURSE ORIENTED PROJECT-I 0 0 0 -100

INPLANT TRAINING

OBJECTIVE

At the end of this course students should be able to know the practical applications of theory in the field.

Students are emphasised to take one month intensive training in reputed construction or design or architecture firm.

SEMESTER V

SEMESTER-V

17BECE501 STRUCTURAL ANALYSIS I 3 2 0 4 100

OBJECTIVES:

1. To understand the concept of analysis of indeterminate structures by various classical methods
2. To study the use of ILD for determinate structure
3. To learn the concepts of moving loads and its effect on structures
4. To understand the concept of equivalent UDL
5. To study the reversal of stress under live load
6. To determine the reversal of stresses in trusses using ILD.

COURSE OUTCOMES

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

1. Use various classical methods for analysis of indeterminate structures.
2. Determine the effect of support settlements for indeterminate structures.
3. Apply the concepts of ILD and moving loads on determinate structures.
4. Apply the concept of equivalent UDL.
5. Determine the reversal of stresses in trusses using ILD.
6. To Analyse the building using different methods available for designing and analysing.

UNIT I STATIC AND KINEMATIC INDETREMINANCY 12

Degree of static and kinematic indeterminacies of frames- analysis of indeterminate frame- Degree of redundancy-Static and Kinematic indeterminacies-propped cantilever and fixed beams - reaction-B.M.D. and S.F.D.

UNIT II MOMENT DISTRIBUTION METHODS 12

Moment-Distribution and carryover of moments – Stiffness and carryover of factors – Analysis of Continuous beams – Analysis of Simple frames – Plane rigid frame with and without sway - Two cycle moment distributions method (No problems)

UNIT III INFLUENCE LINE DIAGRAM 12

Analysis for moving loads-Influence line Diagram (ILD) –ILD for beam with point loads, UDL shorter than span and several point loads at a section -Equivalent UDL-Absolute maximum bending moments for two wheel loads at a fixed distance apart.

UNIT IV ARCHES 12

Arches as structural forms-types of arches-Three-hinged arches-Horizontal thrust-Effect of Temperature change-Straining actions- Parabolic and Circular arches-Two-hinged arches-Horizontal thrust-Effect of temperature change-Straining actions- Parabolic and Circular arches.

UNIT V CABLES AND SUSPENSION BRIDGES 12

Equation of the cable-Horizontal thrust on the cable-Tension in the cable-Length of the cable-Effect of temperature on the cable-Stiffening girders in suspension bridges-with three-hinged and two-hinged stiffening girders

TOTAL:60 HRS

TEXT BOOKS:

S.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Strength of materials and Theory of Structures Vol.I& II	Dr. B.C.Punmia	Laxmi Publications, Chennai	2011

REFERENCE BOOKS:

S.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Structural Analysis-I	Dr P.N Chadramouli	Yes Dee Publication Pvt ltd	2017
2	Intermediate Structural Analysis	C.K. Wang	McGraw Hill, New Delhi	2012
3	Introduction to Structural Analysis	B. D. Nautiyal	New Age International (P) Ltd	2010
4	Fundamentals of Structural Mechanics and Analysis	Gambhir. M.L.	PHI Learning Pvt. Ltd., New Delhi	2011
5	Theory of structures	S.Ramamrutham&R.Narayan	DhanpatRai Publishing Co, New Delhi	2013
6	Structural Analysis – Vol. 1 & Vol. 2	BhavaiKatti, S.S	Vikas Publishing Pvt Ltd., New Delhi	2008

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- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/
- http://icevirtuallibrary.com/

SEMESTER-V

17BECE502 DESIGN OF RC STRUCTURES I 3 2 0 4 100

OBJECTIVE

1. To study the stress strain behavior of steel and concrete
2. To understand the concept of working stress and limit state methods
3. To gain the knowledge of limit state design for flexure, shear, torsion, bond and anchorage
4. To understand the behavior of columns subjected to eccentric load and use of interaction diagrams.
5. To draw detailing of various RCC structural elements.
6. To understand the behavior of columns subjected to eccentric load and use of interaction diagrams

COURSE OUTCOMES

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

1. Apply the fundamental concepts of working stress method and limit state method.
2. Use IS code of practice for the design of concrete elements.
3. Design the beams, slab, stairs, column and footing.
4. Draw detailing of various RCC structural elements.
5. understand the behavior of columns subjected to eccentric load and use of interaction diagrams
6. gain the knowledge of limit state design for flexure, shear, torsion, bond and anchorage

UNIT I

INTRODUCTION 12

Materials for concrete- Stress-Strain curve for concrete in compression-Concrete mix proportioning-Design mix and nominal mix-Types of reinforcement-Plain and deformed bars-Stress-strain curve for reinforcing steel.

Concept of WSD (No problems) and LSD-Difference between WSD and LSD-Characteristic loads and strengths-Partial safety factor-Various limit states.

DESIGN FOR FLEXURE:

Design of singly and doubly reinforced rectangular and flanged sections as per IS code

UNIT II

DESIGN BASICS FOR SHEAR, BOND AND TORSION 12

Design for shear-concept of bond and anchorage-Design for torsion-IS code provision for the design of beams-Design of lintels-Design of continuous beams using B.M. and S.F. co-efficient as per IS code-detailing.

UNIT III

DESIGN OF SLABS **12**

Types of slabs-IS code regulations-Stiffness requirements-Design of one-way simply supported and continuous slab using BM and SF co-efficient as per IS code-Principles of Rankine-Grashof'smethod(no problems)-design of two way, simply supported and continuous slab as per IS code.

UNIT IV

DESIGN OF COLUMNS **12**

IS-code regulations-Design of short rectangular and circular columns subjected to axial compressive load-Design of short columns subjected to combined axial compressive load and uni-axial and biaxial bending moments using design aids(SP 16)- Introduction to long column design

UNIT V

DESIGN OF FOOTINGS **12**

Design of wall footings- Design of isolated, square and rectangular footings.-combined rectangular and trapezoidal footings.

TOTAL:60HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1.	Reinforced Concrete Design	UnnikrishnaPillai&DevadosMenon	Tata McGraw Hill Publishing Co, New Delhi	2012
2.	IS 456-2000 Indian Standard Code of practice for Reinforced Concrete.			
3	SP-16 Design Aids for IS 456-1978. IS 875-1987-Code of Practice for Design Loads			

REFERENCE:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1.	Reinforced Concrete	Mallick, S.K., and Gupta, A.P	Oxford & IBH Publishing Co., New Delhi	2008
2.	Reinforced Concrete Design	Sibha,S.N.	Tata McGraw-Hill Publishing Co, Ltd., New	2001

			Delhi	
3.	Reinforced Concrete Mechanics and Design	MacGregor J.G	Prentice Hall, New Jersey	2008
4.	Reinforced Concrete limit state design	Ashok K Jain	Nem Chand Bros, Roorkee	2012
5.	Limit State Design of R.C.Structures	Varghese, P.C	PHI Learning Pvt. Ltd.. New Delhi	2008

WEBSITES:

- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/

SEMESTER V

17BECE503 SOLID MECHANICS II 3 0 0 3 100

OBJECTIVES:

1. To understand the concept of Principle of virtual work
2. To study the different methods of finding deflection of beam
3. To analyze the Indeterminate beams subjected to various loading
4. To study the different methods to find the deflection of truss
5. To analyze the column with different end conditions and stress in thick cylinders.
6. To determine different stresses developed in thick cylinders.

COURSE OUTCOMES

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

1. Apply the principle of virtual work.
2. Determine deflection of a beam for various loading conditions.
3. Apply unit load method to find the deflection of truss.
4. Determine different stresses developed in thick cylinders.
5. Visualize the behavior of column for combined bending and axial loading.
6. Determine the deflections if beam using different methods

UNIT I **9**

FORCES IN STATICALLY DETERMINATE FRAMES-Method of joints-Method of sections-Graphical method –Deflection -Unit load method-Graphical method-Forces in redundant frames-Castigliano's theorem-Maxwell's method-Tension Co-efficient method.

UNIT II **9**

UNSYMMETRICAL BENDING-stresses in beams subjected to unsymmetrical bending-Deflection of beams –simply supported beams – fixed end beams – Over hanging beams – different load conditions (Point load, UDL,UVL) - under unsymmetrical bending-shear centre.

UNIT III **9**

COMBINED BENDING AND DIRECT STRESSES-Columns and struts-types-failure modes-Euler's formula-Rankin's formula-Johnson's-IS code formula-practical end conditions and effective length factors- Eccentric loading-Middle third rule-Core of a section

UNIT IV **9**

THIN CYLINDRICAL AND SPHERICAL SHELLS- Assumptions-Internal pressure-Change in volume-Minimum thickness of wall plates.

THICK CYLINDRICAL AND SPHERICAL SHELLS -Assumptions Lami's theory-Compound cylinders-Thick spherical shells.

UNIT V **9**

ELEMENTARY THEORY OF VIBRATIONS - Simple harmonic motion - Longitudinal vibration - Helical and Compound springs -Transverse vibrations of beams with point loads and UDL - Torsional vibrations of shafts.

TOTAL: 45HRS

TEXT BOOKS:

S.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Strength of materials and Theory of Structures Vol.I	Dr. B.C.Punmia	Laxmi Publications, Chennai	2011

REFERNENCE BOOKS:

S.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Applied mechanics	V.Devarajan	Padma Publications, New Delhi.	2012
2	Applied Mechanics and Strength of Materials	R.S.Khurmi	Niraja Construction and Development Limited, Tenth Edition, New Delhi,	2012

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- http://www.engineeringcivil.com/
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- http://www.asce.org/
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- http://icevirtuallibrary.com/
- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

SEMESTER V

17BECE504 ENVIRONMENTAL ENGINEERING I 3 0 0 3 100

OBJECTIVES:

1. To make the students conversant with sources and its demand of water
2. To understand the basic characteristics of water and its determination
3. To expose the students to understand the design of water supply lines
4. To provide adequate knowledge about the water treatment processes and its design
5. To have adequate knowledge on operation and maintenance of water supply.
6. To understand the design of water supply lines

COURSE OUTCOMES

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

1. Identify the source of water and water demand.
2. Apply the water treatment concept and methods.
3. Apply water distribution processes and operation and maintenance of water supply.
4. Prepare basic process designs of water and wastewater treatment plants collect, reduce, analyze, and evaluate basic water quality data.
5. Gain the knowledge of distribution system and their methods.
6. understand the design of water supply lines

UNIT I **9**

PLANNING FOR WATER SUPPLY SYSTEMS: Planning Factors for Water Supply schemes-Population forecasting – Design period – Variations in demand pattern-Water demand characteristics - Standards –

UNIT II **9**

SOURCES OF WATER-classification of source- water quality parameters & significance –Intake structures, Wells, Infiltration Gallery, Tube wells- Construction & Development-Sanitary Protection of wells- yield of wells.

UNIT III **9**

CONVEYANCE OF WATER: Pipes and channels for transmitting water -Selection of materials for pipes and conduits-Laying, jointing & testing of pipes – Pipe appurtenances-Various types of pumps-Pump selection–Pumping station.

UNIT IV **9**

WATER TREATMENT: General layout of a water treatment plant– Principles of screening, flocculation, flash mixing, sedimentation, filtration-various techniques of disinfection– Brief on water softening, De-mineralization, and aeration

UNIT V

STORAGE&DISTRIBUTION OF WATER: **9**

Service reservoirs-elevated and ground level reservoirs-equalizing and service storage- factors affecting storage capacity-distribution network patterns – Analysis of distribution network – Hardy

Cross method – Equivalent Pipe method – Leak detection in pipe network - Corrosion control, Lining of pipes-Appurtenances

TOTAL: 45HRS

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Water Supply Engineering	Garg, S.K	KhannaPublishers,New Delhi	2012

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Hand book on Water Supply and Drainage-SP35		B.I.S,New Delhi	2007
2	Water supply Engineering	Fair G.M, Geyer.J.C	Khanna Publishing Co., New Delhi	2007
3	Water Supply Engineering	Punmia B C Ashok Jain Arun Jain	Laxmi Publications, Delhi	2010

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- http://www.icivilengineer.com
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- http://www.aboutcivil.com/
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- http://www.cif.org/
- http://icevirtuallibrary.com/
- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

SEMESTER-V

17BECE505A WATER RESOURCES ENGINEERING 3 0 0 3 100

OBJECTIVES:

1. To build on the student's background in hydrology and hydraulics an understanding of water resources systems.
2. To develop the skills in modeling of flood flows and flood routing
3. To develop skills in the ground water flow, type of aquifer and yield from the well.
4. To provide the knowledge of design of reservoir, operation and sedimentation.
5. To Design of reservoir, operation and sedimentation
6. To know the skills in modeling of flood flows and flood routing

COURSE OUTCOMES

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

1. Incorporate the analytical abilities in the planning and design of water resource systems.
2. Apply the knowledge on reservoir planning and investigation
3. Design of reservoir, operation and sedimentation
4. the skills in modeling of flood flows and flood routing
5. Gained the knowledge about different water structures
6. To know about the unit hydrograph and its applications.

UNIT I **9**

INTRODUCTION: Irrigation – Need and mode of irrigation – Merits and demerits of irrigation – environmental impacts of irrigation- Classification of irrigation projects - Crop and crop seasons – consumptive use of water – Duty, Delta and Base period – Factors affecting duty – Irrigation efficiencies.

PRECIPITATION: Types of precipitation – Forms of precipitation – Measurement of Rainfall – Losses from precipitation-- Hydrograph - Factors affecting Hydrograph – Base flow separation – Unit hydrograph – S curve hydrograph

UNIT II **9**

RIVER ENGINEERING: Rivers –Types and Behavior

WATER LOGGING: Causes of water logging - Effects of water logging – Remedial measures for water logging

DRAINAGE: Necessity – Advantages – Methods.

RIVER STRUCTURES: Diversion Head works- Brief Description of component parts and their functions- - Seepage theories.

UNIT III **9**

CANAL ENGINEERING: Alignment of canals – Classification of canals - Distribution network - Canal Losses - Cross sectional details - Sedimentation in canals - Silt theories - Balancing depth of cutting

CANAL LINING: Types, Construction and Maintenance

CANAL AND RIVER STRUCTURES: Canal regulators and Types - Canal Falls and Types

CROSS DRAINAGE WORKS: Types- Selection -River Training works – types.

UNIT IV **9**

RIGID STORAGE STRUCTURES: Gravity dams Description– Arch and Buttress dam – Spillways – Factors affecting location and type of dams – Forces on a dam – Galleries and types.

Non Rigid Storage Structures: Earth dams - Causes of failure - Typical cross sections to suit site conditions and available materials - Phreatic line – Tanks – Classification – Components - types of Bunds

UNIT V **9**

RESERVOIR PLANNING: Reservoirs- Types- Zones of storage – Capacity - Yield- Area - Elevation and capacity- Elevation curves - Mass curve analysis - Capacity for specific demand and yield for given capacity- Fixing reservoir capacity- Reservoir sedimentation and control- Selection of site for reservoir

Other Irrigation Structures: Surplus Weir- Tower Head Sluice- Wing wall type- (Theoretical Approach only)- Culverts- Small ROAD bridges across drains- Canal outlets and flumes- Types (Theoretical Aspect only).

TOTAL: 45HRS

TEXT BOOKS:

Sl. No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Irrigation Engineering and Hydraulic structures	Garg, S.K	Khanna Publishers, New Delhi	2012

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Irrigation and Water Power Engineering	Punmia B.C., Pande B.B.Lal	Lakshmi Publications, Chennai.	2012
2	Irrigation Engineering and Hydraulic Structures	SahasraBudheS.R	S.K. Kataria &Sons, Chennai	2014
3	Irrigation Engineering	RK Sharma, TK Sharma	S.Chand& Company Ltd., New Delhi	2009

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- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/
- http://icevirtuallibrary.com/
- http://www.ice.org.uk/

17BECE505B BUILDING SERVICES 3 0 0 3 100

OBJECTIVE:

1. To impart knowledge on electrical systems and light illumination in buildings.
2. To understand the basic principles of fire safety and its codal provisions in buildings.
3. To apply various fire safety installations.
4. To gain knowledge of different electrical systems in buildings
5. To know about motors and generators and services used in concrete mixers.
6. To gain the knowledge of the refrigerators and its applications.

COURSE OUTCOMES

Students will be able to understand

1. Various machineries of construction, electrical systems in building,
2. Design and principle of illumination, refrigeration principle
3. Application Various fire safety installations.
4. Different electrical systems in buildings
5. Different motors and generators and services used in concrete mixers.
6. Will gain the knowledge of the refrigerators and its applications.

UNIT I MACHINERIES 9

Hot Water Boilers – Lifts and Escalators – Special features required for physically handicapped and elderly – Conveyors – Vibrators – Concrete mixers – DC/AC motors – Generators – Laboratory services – Gas, water, air and electricity

UNIT II ELECTRICAL SYSTEMS IN BUILDINGS 9

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations

UNIT III PRINCIPLES OF ILLUMINATION & DESIGN 9

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour – Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor – MSCP – MHCP – Lans of illumination – Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

UNIT IV REFRIGERATION PRINCIPLES & APPLICATIONS 9

Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour – Subcooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors – Starters – Air handling units – Cooling towers – Window type and packaged air-conditioners –

Chilled water plant – Fan coil systems – Water piping – Cooling load – Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems

UNIT V FIRE SAFETY INSTALLATION 9

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers

TOTAL : 45 HRS

TEXT BOOKS:

Sl.No	**Title of Book**	**Author of Book**	**Publisher**	**Year of Publishing**
1	Heat Pumps and Electric Heating	E.R.Ambrose	John and Wiley and Sons, Inc., New York	2002
2	Handbook for Building Engineers in Metric systems, NBC, New Delhi, 2005.			

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Lighting in Architectural Design	Philips	McGraw-Hill, New York,	2000.
2	Air-conditioning and Energy Conservation	A.F.C. Sherratt	The Architectural Press, London	2005.
3	National Building Code.			

SEMESTER-V

17BECE5E-- PROFESSIONAL ELECTIVE I 3 0 0 3 100

TOTAL: 45HRS

SEMESTER-V

17BECE511 STRENGTH OF MATERIALS LABORATORY0 0 3 2 100

OBJECTIVES:

1. To find the Young Modulus, torsional strength, hardness and tensile strength of given specimens
2. To find impact value and crushing value of coarse aggregates
3. To find the compressive strength of concrete cubes and bricks
4. To find stiffness of open coiled and closed coiled springs
5. To find the physical properties of given coarse aggregate, fine aggregate and cement sample
6. will possess knowledge about material testing techniques.

COURSE OUTCOMES

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

1. Evaluate Young Modulus, torsional strength, hardness and tensile strength of given specimens.
2. Determine the strength of coarse aggregates.
3. Find the compressive strength of concrete cubes and bricks.
4. Find stiffness of open coiled and closed coiled springs.
5. Determine the physical properties of given coarse aggregates, fine aggregates and
6. Determine the physical properties of given cement samples.

LIST OF EXPERIMENTS

1. Study of UTM, Torsion testing machine, Hardness tester, Compression testing machine
2. Tension Test on M.S. and HYSD bars
3. Test involving Torsion to obtain the Torque vs. Angle of twist and hence the stiffness
4. Test on steel beam – Bending test - compression test
5. Tests on Metals
    - Hardness test on metals (Brinell and Rockwell Tests)
    - Impact test. (Izod and Charpy Tests)
    - Shear test
6. Tests on springs for Stiffness

The student should learn the use of deflectometer, extensometer, and strain gauges.

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of

				Publishing
1	Solid Mechanics	Kazimi S.M.A	Tata McGraw-Hill Publishing Co, New Delhi	2003
2	Theory and Problems of Strength of Materials	William Nash	Schaum's Outline Series, McGraw-Hill International,Delhi.	2005
3	Advanced Mechanics of Solids	Srinath L.S	Tata McGraw-Hill Publishing Co., Delhi	2003
4	Strength of Materials	R.S. Khurmi	S. Chand & Company Ltd, New Delhi	2008

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- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/

SEMESTER-V

17BECE512APPLIED HYDRAULICS &HYDRAULIC MACHINERY LABORATORY

0 0 3 2 100

OBJECTIVES:

1. To understand the flow measurement in a pipe flow
2. To determine the energy loss in pipe flow
3. To study the characteristics of turbines
4. To study the characteristics of pumps
5. To measure the discharge in a open channel flow
6. To gain a brief knowledge of different types of pumps and its applications

COURSE OUTCOMES

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

1. Measure discharge in pipes.
2. Determine the energy loss in conduits.
3. Demonstrate the characteristics curves of pumps
4. Demonstrate the characteristics curves of turbines.
5. Carry out discharge measurements in open channel.
6. Brief knowledge of different types of pumps and its applications

LIST OF EXPERIMENTS

1. Determination of co-efficient of discharge for orifice
2. Determination of co-efficient of discharge for venturimeter
3. Determination of co-efficient of discharge for orifice meter
4. Friction losses in pipes(Major& minor)
5. Determination of performance characteristics of Francis turbine
6. Determination of performance characteristics of Centrifugal pumps (Constant speed / variable speed)
7. Study on performance characteristics of Reciprocating pump.
8. Determination of performance characteristics of Submersible pump.
9. Experiment on Bernoulli’s theorem

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	A text book of Fluid Mechanics	Rajput, R.K	S.ChandPublishers,New Delhi	2012
2	Fluid Mechanics, Hydraulics & Fluid Machines	Ramamrutham. S	DhanpatRai& Sons, New Delhi	2013

SEMESTER-V
VALUE ADDED COURSE

17BECE551 COURSE ORIENTED PROJECT-II 0 0 0-100

SURVEY CAMP

OBJECTIVE

- At the end of this course students should be able to know the practical applications of survey in the field.
- Students are emphasised to take intensive training in the field limited to one week outside the campus.

SEMESTER VI

SEMESTER VI

17BECE601 STRUCTURAL ANALYSIS II 3 2 0 4100

OBJECTIVES:

1. To understand the influence line concepts for indeterminate structures
2. To understand the methods of analysis of intermediate trusses for external loads, lack of fit and thermal effect
3. To study behaviour of arches and their methods of analysis
4. To know the concept and analysis of cable stayed bridge
5. To study the multi storey frames subjected to gravity loads and lateral loads
6. To analyses cable suspension bridges.

COURSE OUTCOMES

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

1. Demonstrate the concepts of qualitative influence line diagram for continuous beams and frames
2. Apply the methods of indeterminate truss analysis.
3. Demonstrate the behavior of arches and their methods of analysis.
4. Analyse cable suspension bridges.
5. Analyse multistory frames subjected to gravity loads and lateral loads.
6. Analyse multi storey frames subjected to gravity loads and lateral loads

UNIT I **12**

Indeterminate structures - Slope deflection method - Continuous beams and fixedbeam– Simplification of hinged end – support settlement - Simple frames - Portal frames Consistent-deformation method-continuous beams.

UNIT II **12**

Strain energy method- Castigliano's theorem- Deflection by strain energy method – evaluation of strain energy in member under different loading – Application of strain energy method for Beams and frames - Beams curved in plan.

UNIT III **12**

Flexibility method -Equilibrium and Compatibility – Determinate vs Indeterminate structures – Indeterminacy – Primary Structure – Compatibility conditions – Analysis of indeterminate pin – jointed plane frames, continuous beams, rigid jointed plane frames (with redundancy restricted to two).

UNIT IV **12**

Stiffness method-Beams-Trusses-Simple frames-Portal frames-Grids-Lack of fit-Temperature stresses-Support settlements-Elastic supports.(Direct approach)- Introduction to Finite element.

UNIT V **12**

Plastic Analysis of Structures : Statically indeterminate axial problems – Beams in pure bending – Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism – Plastic analysis of indeterminate beams and frames.

TOTAL:60HRSTEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Strength of materials and Theory of Structures Vol.I, II	Dr.B.C.Punmia	Laxmi Publication, New Delhi	2012

REFERENCE BOOKS:

Sl.No	Title of the Book	Author of the Book	Publisher	Year of Publishing
1	Intermediate Structural Analysis	C.K. Wang	McGraw-Hill, New Delhi	2002
2	Matrix Analysis of Framed structures	W.Weaver and J.M Gere	Van NostrandReinhold,New York	2003
3	Structural analysis, a matrix approach	G.S.Pandit and S.P.Gupta	Tata McGraw Hill	2004
4	Theory of structures	S.Ramamrutham&R.Narayan	DhanpatRai Publishing Co, New Delhi	2013
5	Analysis of Structures-Vol.II	Prof.V.N. Vazirani, Dr.M.M.Ratwani, Dr.S.K.Duggal	Khanna Publishers, Chennai	2012

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- http://www.engineersdaily.com
- http://www.asce.org/
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- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

SEMESTER VI

17BECE602 DESIGN OF RC STRUCTURES II 3 2 0 4100

OBJECTIVE

1. To understand the design concept of various structures and detailing of reinforcements.
2. To understand the design of underground and elevated liquid retaining structures.
3. To study the design of material storage structures.
4. To know the effect of temperature on concrete structures.
5. To study the design of bridges subjected to IRC loading.
6. To design of material storage structures

COURSE OUTCOMES

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

1. Apply the concepts of liquid retaining structures.
2. Design material storage structures using various theories.
3. Apply the concepts of environmental and transportation structures.
4. Demonstrate the detailing of reinforcement.
5. Draw the various RCC structures.
6. design of material storage structures

UNIT 1

YIELD LINE THEORY 12

Introduction-Assumptions - Characteristics of yield line - Determination of collapse load / plastic moment- Application of virtual work method - square, rectangular, circular and triangular slabs With point load and UDL (Simply support and Fixed support)- Design problems.

UNIT II

BUILDING FRAMES 12

Multi storeyed structures and framed structures-Elastic analysis ,Suitable substitute frames for gravity loadings-Approximate analysis of single and two bay frames up to three storeys using portal method and cantilever method.

UNIT III

RETAINING WALLS 12

Design of Cantilever retaining wall – Design of Counterfort Retaining walls-Stability Analysis.

UNIT IV

WATER TANKS 12

Classification-IS code provisions-Principles of design-Design of rectangular and circular water tanks , below ground level, tanks resting on ground and Elevated tanks – Intze type water tank (Theory only)

UNIT V

SPECIAL ELEMENTS 12

Design of staircases (Straight and doglegged) – Design of flat slabs – Design Principles of Mat foundation and box culvert. **TOTAL: 60 HRS**

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	R.C.C. Designs Reinforced Concrete Structures	Punmia B.C, Ashok Kumar Jain, ArunK.Jain	Laxmi Publications Pvt. Ltd., New Delhi	2006

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Advanced Reinforced Concrete Design	Varghese.P.C	Prentice Hall of India Pvt. Ltd New Delhi.	2012
2	Reinforced Concrete	Mallick, D.K. and Gupta A.P	Oxford and IBH Publishing Company, New York	2003
3	Design of Reinforced Concrete Structures	Gambhir.M.L	Prentice Hall of India Private Limited, New york	2012

WEBSITES:

- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/
- http://icevirtuallibrary.com/
- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

SEMESTER-VI

17BECE603 ENVIRONMENTAL ENGINEERING II 3 0 0 3 100

OBJECTIVE

1. To learn the basics of sewage composition and its characteristics
2. To depict the information about various sewage treatment processes
3. To provide the adequate information on various disposal standards for industrial effluents
4. To study the information about air pollution and its effects
5. To understand the knowledge about solid waste generation and disposal methods.
6. To gain the information about various sewage treatment processes

COURSE OUTCOMES

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

1. Determine the sewage characteristics and design various sewage treatment plants.
2. Analyze the status of surface water and ground water quality and the remediation technologies.
3. Carry out municipal water and wastewater treatment system design and operation.
4. Manage hazardous wastes, risk assessment and treatment technologies apply environmental treatment technologies and design process.
5. study the information about air pollution and its effects
6. gain the information about various sewage treatment processes

UNIT I **9**

SEWERAGE SYSTEM: Definitions-Classification – Quantity of sewage – Fluctuations in Flow pattern- Estimation of storm run off-Design of flow for separate and combined systems

UNIT II **9**

SEWAGE COLLECTION: Sanitary Fixtures and Fittings- Systems of House Drainage- General Layout- Anti siphonage- Connection of House sewer to public sewer- Materials for sewers- – Laying, jointing and testing of sewers- Sewer Maintenance- Sewage pumping- Types of pumpsSewer appurtenances – Pump selection

UNIT III **9**

SEWAGE TREATMENT- PHYSICO CHEMICAL: Objectives- Characteristics and Composition of sewage-Analysis- Cycles of decomposition- design - principles of sewage treatment- screen chamber, grit chamber, primary sedimentation tanks

UNIT IV **9**

SEWAGE TREATMENT- BIOLOGICAL: Fundamentals of microbiology of waste water- Basic Principles of Biological Treatment-Design principles - trickling filter - activated sludge process- UASB reactor- Modifications- Low cost treatment methods

UNIT V **9**

SLUDGE TREATMENT AND EFFLUENT DISPOSAL: Objectives of sludge treatment- Properties and characteristics of sludge- methods of disposal- Conventional and high rate digesters- Sludge Lagooning- Sludge thickening methods- Effluent disposal on land- Sewage farming practices- Dilution- Standards for disposal - Disposal into water bodies Eutrophication- Oxygen sag curve- Recycle and reuse of waste effluents

TOTAL: 45HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Sewage and waste Disposal Engineering	Garg, S.K	Khanna Publishers, New Delhi	2012

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Wastewater Engineering – Treatment & Reuse	Metcalf and Eddy, M.C	Tata McGraw-Hill Publications, New Delhi	2003
2	Water supply Engineering	Fair G.M, Geyer.J.C	Khanna Publishing Co., New Delhi	2002
3	Water Supply and Sanitary Engineering	Birdie G.S	DhanpatRai& Sons, New Delhi	2003
4	Environmental engineering II Waste water engineering (including air pollution)	Punmia B.C Ashok K Jain Arun K Jain	Laxmi Publications, Delhi	2010

WEBSITES:

- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/

SEMESTER-VI

17BECE604 DESIGN OF STEEL STRUCTURES 3 2 0 4 100

OBJECTIVE

1. To learn IS 800-2007 code of practice for the design of Compression, Tension and Flexural members using various cross-sections.
2. To study the behaviour and design of compression and tension members using simple and built-up sections.
3. To understand behaviour of flexural members and the design laterally restrained and unrestrained beams.
4. To study the components of truss, loads on trusses, analysis and design of purlins and truss members.
5. To study the design of bolted and welded connections and arranging field visit to industries.
6. To design components of truss, loads on trusses, analysis and design of purlins and truss members.

COURSE OUTCOMES

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

1. Apply the IS code of practice for the design of steel structural elements.
2. Design compression and tension members using simple and built-up sections.
3. Calculate forces on the various members of the truss and design them.
4. Analyze the behavior of bolted connections and design them.
5. Design welded connections for both axial and eccentric forces.
6. Design components of truss, loads on trusses, analysis and design of purlins and truss members.

UNIT I **12**

INTRODUCTION: Properties of steel – Structural steel sections – Limit State Design Concepts – Loads on Structures – Metal joining methods using, welding, bolting – Design of bolted, and welded joints – Eccentric connections - Efficiency of joints – High Tension bolts

UNIT II **12**

TENSION MEMBERS: Types of sections – Net area – Net effective sections for angles and Tee in tension – Design of connections in tension members – Use of lug angles – Design of tension splice – Concept of shear lag

UNIT III **12**

COMPRESSION MEMBERS: Types – Basis of codal provision for compression member design – Slenderness ratio – Design of single section and compound section– Design of lacing and battening – Design of column bases – Gusseted base

UNIT IV **12**

BEAMS: Design of laterally supported and unsupported beams – Built up beams – Design of plate girders bolted and welded – Intermediate and bearing stiffeners – flange and Web splices

UNIT V **12**

ROOF TRUSSES AND INDUSTRIAL STRUCTURES: types of Roof trusses – Roof and side coverings –Design loads, design of purlin and elements of truss; end bearing - Design of Gantry Girders

TOTAL: 60 HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Design of Steel Structures – Vol. I & II	Ramachandra, S	Standard Publication, New Delhi	2009

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Design of Steel Structures, Second edition	Dayaratnam, P	S. Chand & Company, Uttar Pradesh	2003
2	Design of Steel Structures	Gaylord, E.H., Gaylord, N.C., and Stall Meyer, J.E	McGraw-Hill Publications. New Delhi	2005
3	IS 800-2007 Code of Practice for General Construction in Steel IS 875 Part I,II,III			

WEBSITES:

- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/
- http://icevirtuallibrary.com/
- http://www.ice.org.uk/

SEMESTER-VI

17BECE6E-- PROFESSIONAL ELECTIVE II 3 0 0 3 100

TOTAL: 45HRS

SEMESTER-VI

17BECE6E-- PROFESSIONALELECTIVE III 3 0 0 3 100

TOTAL: 45HRS

SEMESTER VI`

17BECE611 CONCRETE AND HIGHWAY LABORATORY 0 0 3 2 100

OBJECTIVE

1. To find impact value and crushing value of coarse aggregates
2. To find the compressive strength of concrete cubes and bricks
3. To find the physical properties of given coarse aggregate, fine aggregate
4. To find the physical properties of given cement samples
5. To learn the characteristics, properties and testing procedures of aggregate
6. To learn the characteristics, properties and testing procedures of bitumen

COURSE OUTCOMES

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

1. Determine the strength of coarse aggregates.
2. Find the compressive strength of concrete cubes and bricks.
3. Determine the physical properties of given coarse aggregates, fine aggregates and cement samples.
4. Characterize the aggregate used for road construction
5. Characterize the bitumen used for road construction.
6. Know the characteristics, properties and testing procedures of bitumen

LIST OF EXPERIMENTS

A. TEST ON CONCRETE

- Workability test on concrete- Slump, Compaction factor and Vee –Bee test
- Strength test on concrete – Compressive Strength ,Direct tensile strength, Split tensile strength test and Flexural strength test

B. TEST ON AGGREGATE

- Flakiness Index and Elongation Index
- Crushing Value and Impact Value
- Abrasion test- Deval abrasion test

C. TEST ON BITUMEN

- Ductility Test
- Viscosity Test
- Specific Gravity Test
- Flash and Fire Point Test

REFERENCES

S.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Specifications for Road and Bridges, MORTH (India)			1985
2	IS 1489 (Part 1 and 2) Specifications for Portland Pozzolana Cement			1976
3	IS 2386 (Part 1to 8) Methods of Test for Aggregates for Concrete			1986
4	IS 10262-1982 Recommended Guidelines for Concrete Mix Design			1982
5	IS 1199 1959 methods of Sampling and Analysis of Concrete			1959
6	Bureau of Indian Standards (BIS) Publications on Highway Materials			1965
7	Highway Engineering	Khanna K and Justo C E G	Khanna Publishers, Roorkee	2012

SEMESTER-VI

17BECE612 ENVIRONMENTAL ENGINEERING LABORATORY 0 0 3 2 100

OBJECTIVES:

1. To quantify the water and wastewater pollutant
2. To measure the concentration of air pollutants
3. To analyze the characteristics of water
4. To analyze the characteristics of wastewater and ambient air
5. To determine the characteristics of ambient air
6. To study the growth of microorganism and its quantification

COURSE OUTCOMES

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

1. Quantify the pollutant concentration in water, wastewater and ambient air.
2. Recommend the degree of treatment required for the water and wastewater.
3. Analyse the survival conditions for the microorganism and its growth rate.
4. Quantify the water and wastewater pollutant
5. Measure the concentration of air pollutants
6. Analyze the characteristics of water

LIST OF EXPERIMENTS

1. Sampling and preservation methods and significance of characterization of water and wastewater.
2. Determination of
   i) PH and turbidity
   ii) Hardness
3. Determination of iron & fluoride
4. Determination of residual chlorine
5. Determination of Chlorides
6. Determination of Ammonia Nitrogen
7. Determination of Sulphate
8. Determination of Optimum Coagulant Dosage
9. Determination of available Chlorine in Bleaching powder
10. Determination of dissolved oxygen
11. Determination of suspended, volatile and fixed solids
12. B.O.D. test
13. C.O.D. test
14. Introduction to Bacteriological Analysis (Demonstration only)

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Standard methods for the examination of water and wastewater	Handbook	APHA, 20th Edition,Washington	2010
2	Environmental Engineering Vol. I & II	Garg, S.K	Khanna Publishers, New Delhi	2003

SEMESTER-VI

VALUE ADDED COURSE

17BECE651 IRRIGATION AND ENVIRONMENTAL ENGINEERING DRAWING 0 0 3 - 100

OBJECTIVES:

1. To learn the software developing skills for structural design.
2. To understand the computing techniques in the field of transportation.
3. To gain knowledge in problem solving in water resources.
4. To apply computing techniques to transportation engineering.
5. To apply computing skills to water resources and environmental engineering.
6. To apply computing skills to geotechnical engineering.

COURSE OUTCOMES

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

1. Apply the software skills in the design of infrastructure.
2. Apply computing techniques to transportation engineering.
3. Apply computing skills to water resources and environmental engineering.
4. Apply computing skills to geotechnical engineering.
5. Learn the software developing skills for structural design.
6. Understand the computing techniques in the field of transportation.

ENVIRONMENTAL ENGINEERING DRAWING

This subject includes process design (excluding Structural Design) of major units associated with water and sewage treatment and transport including house building drainage. At the end of the course, the student is expected to know about the sizing of treatment plant units and draw the general arrangement.

1. General layout of water and waste treatment plants
2. Sedimentation aided with coagulation
3. Slow sand filter
4. Rapid sand filter
5. Trickling filter
6. Septic tank

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Irrigation Engineering and Design of Structures	Garg, S.K	Published by Mrs. L.Banumathi,Tuni	2012
2	Irrigation Design and Drawing	Satyanarayana Murthy	East Godavari District, A.P	2002

3	Irrigation Engineering and Hydraulic Structures	Sharma R.K	Oxford and IBH Publishing Co., New Delhi	2002

REFERENCES

Sl.No	**Title of Book**	**Author of Book**	**Publisher**	**Year of Publishing**
1	Manual on Water Supply and Treatment, CPHEEO, Government of India, New Delhi			1999
2	Manual of Sewerage and Sewage Treatment, CPHEEO, Government of India, New Delhi			1993
4	Environmental Engineering	Peary, H.S., Rowe, D.R., and Tchobanoglous,G	McGraw-Hill BookCo., New Delhi	2005
5	Wastewater Engineering (Treatment and Reuse)", 4th Edition	Metcalf & Eddy	Tata McGraw-Hill, New Delhi	2003

SEMESTER VII

SEMESTER-VII

17BECC701 PROFESSIONAL ETHICS, PRINCIPLES OF MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT **3 0 0 3 100**

OBJECTIVES:

1. To enable the students to create an awareness on Engineering Ethics, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.
2. To familiarize the students to what constitutes professional practice, introduction of various stakeholders and their respective roles; understanding the fundamental ethics governing theprofession
3. To give a good insight into contracts and contracts management in civil engineering, dispute resolution mechanisms; laws governing engagement oflabour.
4. To give an understanding of Intellectual Property Rights,Patents.
5. To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineeringprofession
6. To develop good ideas of the legal and practical aspects of theirprofession

OUTCOMES:

At the end of course students may be able to

1. Familiarize the students to what constitutes professional practice, introduction of various stakeholders and their respective roles; understanding the fundamental ethics governing theprofession
2. Have good insight into contracts and contracts management in civil engineering, dispute resolution mechanisms; laws governing engagement oflabour.
3. Understand the Intellectual Property Rights,Patents.
4. Understand the types of roles they are expected to play in the society as practitioners of the civil engineeringprofession
5. Develop good ideas of the legal and practical aspects of theirprofession
6. Gathered ideas of the legal and practical aspects of theirprofession

UNIT I ENGINEERING ETHICS **9**

Senses of 'Engineering Ethics' – variety of moral issued – types of inquiry – moral dilemmas – moral autonomy – Kohlberg's theory – Gilligan's theory – consensus and controversy – Models of Professional Roles – theories about right action – Self–interest – customs and religion – uses of ethical theories.

UNIT II FACTORS OF CHANGES **9**

Forces that shape culture, social control – Meaning, Agencies, Institution, Customs, Values, Folkways, Norms and Laws. Social changes – Meaning and nature – Theories.

UNIT III HISTORICAL DEVELOPMENT, PLANNING, ORGANISING **9**

Definition of Management – Management and Administration – Development of Management Thought – Contribution of Taylor and Fayol – Functions of Management – Steps involved in Planning – Objectives – Setting Objectives – Process of Managing by Objectives – Strategies, Policies and Planning Premises– Forecasting – Decision–making – Formal and informal organization – Organization Chart –.

UNIT IV DIRECTING AND CONTROLLING **9**

Human Factors – Creativity and Innovation – Harmonizing Objectives – Leadership – Types of Leadership Motivation – Hierarchy of needs – Motivation theories – Motivational Techniques – Job

Enrichment –Process of Communication – System and process of Controlling – Requirements for effective control – Control of Overall Performance – Direct and Preventive Control – Reporting

UNIT V ENTREPRENEURSHIP AND MOTIVATION 9

Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur – Entrepreneurship in Economic Growth– Major Motives Influencing an Entrepreneur – Achievement Motivation Training, self Rating, Business Game, Thematic Apperception Test – Stress management, Entrepreneurship Development Programs – Need, Objectives.

TOTAL: 45 HRS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Harold Kooritz and Heinz Weihrich	Essentials of Management	Tata McGraw Hill, New Delhi	2010
2	Khanka S.S	Entrepreneurial Development	S.Chand and Co. Ltd., NewDelhi	2006
3	Mike Martin and Roland Schinzinger	Ethics in Engineering	McGraw–Hill, NewYork	2005

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Tripathy P.C and Reddy P.N	Principles of Management	Tata McGraw Hill, New Delhi	2008
2	Rabindra N Kanungo	Entrepreneurship and innovation	Sage Publications, New Delhi	1998
3	Charles E Harris, and Michael J Rabins	Engineering Ethics – Concepts and Cases	Wadsworth Thompson Learning, New Delhi	2013

REFERENCES

1. http://www.managementstudyguide.com/taylor_fayol.htm
2. http://tutor2u.net/business/gcse/people_motivation_theories.htm
3. http://lfkkb.tripod.com/eng24/gilliganstheory.html
4. http://www.developingeyes.com/five–types–of–entrepreneurs/

SEMESTER-VII

17BECE702A WATER RESOURCES ENGINEERING 3 0 0 3 100

OBJECTIVES:

1. To build on the student's background in hydrology and hydraulics an understanding of water resources systems.
2. To develop the skills in modeling of flood flows and flood routing
3. To develop skills in the ground water flow, type of aquifer and yield from the well.
4. To provide the knowledge of design of reservoir, operation and sedimentation.
5. To know the different aquifers and the water table level.
6. To plan reservoirs and storage tanks

COURSE OUTCOMES

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

1. Incorporate the analytical abilities in the planning and design of water resource systems.
2. Apply the knowledge on reservoir planning and investigation
3. Model the flood flows and flood routings.
4. Gain the knowledge of design of reservoir, operation and sedimentation
5. Will know the different aquifers and the water table level.
6. Planning of reservoirs and storage tanks.

UNIT I **9**

INTRODUCTION: Irrigation – Need and mode of irrigation – Merits and demerits of irrigation – environmental impacts of irrigation- Classification of irrigation projects - Crop and crop seasons – consumptive use of water – Duty, Delta and Base period – Factors affecting duty – Irrigation efficiencies.

PRECIPITATION: Types of precipitation – Forms of precipitation – Measurement of Rainfall – Losses from precipitation-- Hydrograph - Factors affecting Hydrograph – Base flow separation – Unit hydrograph – S curve hydrograph

UNIT II **9**

RIVER ENGINEERING: Rivers –Types and Behavior

WATER LOGGING: Causes of water logging - Effects of water logging – Remedial measures for water logging

DRAINAGE: Necessity – Advantages – Methods.

RIVER STRUCTURES: Diversion Head works- Brief Description of component parts and their functions- - Seepage theories.

UNIT III **9**

CANAL ENGINEERING: Alignment of canals – Classification of canals - Distribution network - Canal Losses - Cross sectional details - Sedimentation in canals - Silt theories - Balancing depth of cutting

CANAL LINING: Types, Construction and Maintenance

CANAL AND RIVER STRUCTURES: Canal regulators and Types - Canal Falls and Types

CROSS DRAINAGE WORKS: Types- Selection -River Training works – types.

UNIT IV **9**

RIGID STORAGE STRUCTURES: Gravity dams Description– Arch and Buttress dam – Spillways – Factors affecting location and type of dams – Forces on a dam – Galleries and types.

Non Rigid Storage Structures: Earth dams - Causes of failure - Typical cross sections to suit site conditions and available materials - Phreatic line – Tanks – Classification – Components - types of Bunds

UNIT V **9**

RESERVOIR PLANNING: Reservoirs- Types- Zones of storage – Capacity - Yield- Area - Elevation and capacity- Elevation curves - Mass curve analysis - Capacity for specific demand and yield for given capacity- Fixing reservoir capacity- Reservoir sedimentation and control- Selection of site for reservoir

Other Irrigation Structures: Surplus Weir- Tower Head Sluice- Wing wall type- (Theoretical Approach only)- Culverts- Small ROAD bridges across drains- Canal outlets and flumes- Types (Theoretical Aspect only).

TOTAL: 45HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Irrigation Engineering and Hydraulic structures	Garg, S.K	KhannaPublishers,New Delhi	2012

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Irrigation and Water Power Engineering	Punmia B.C., Pande B.B.Lal	Lakshmi Publications, Chennai.	2012
2	Irrigation Engineering and Hydraulic Structures	SahasraBudheS.R	S.K. Kataria &Sons, Chennai	2014
3	Irrigation Engineering	RK Sharma, TK Sharma	S.Chand& Company Ltd., New Delhi	2009

WEBSITES:

- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/
- http://icevirtuallibrary.com/

17BECE702B BUILDING SERVICES 3 0 0 3 100

OBJECTIVE:

1. To impart knowledge on electrical systems and light illumination in buildings.
2. To understand the basic principles of fire safety and its codal provisions in buildings.
3. To apply various fire safety installations.
4. To gain knowledge of different electrical systems in buildings
5. To know about motors and generators and services used in concrete mixers.
6. To gain the knowledge of the refrigerators and its applications.

COURSE OUTCOMES

Students will be able to understand

1. Various machineries of construction, electrical systems in building,
2. Design and principle of illumination, refrigeration principle
3. Application Various fire safety installations.
4. Different electrical systems in buildings
5. Different motors and generators and services used in concrete mixers.
6. Will gain the knowledge of the refrigerators and its applications.

UNIT I MACHINERIES 9

Hot Water Boilers – Lifts and Escalators – Special features required for physically handicapped and elderly – Conveyors – Vibrators – Concrete mixers – DC/AC motors – Generators – Laboratory services – Gas, water, air and electricity

UNIT II ELECTRICAL SYSTEMS IN BUILDINGS 9

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations

UNIT III PRINCIPLES OF ILLUMINATION & DESIGN 9

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour – Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor – MSCP – MHCP – Lans of illumination – Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

UNIT IV REFRIGERATION PRINCIPLES & APPLICATIONS 9

Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour –

Subcooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors – Starters – Air handling units – Cooling towers – Window type and packaged air-conditioners – Chilled water plant – Fan coil systems – Water piping – Cooling load – Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems

UNIT V FIRE SAFETY INSTALLATION 9

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers

TOTAL : 45 HRS

TEXT BOOKS:

Sl.No	**Title of Book**	**Author of Book**	**Publisher**	**Year of Publishing**
1	Heat Pumps and Electric Heating	E.R.Ambrose	John and Wiley and Sons, Inc., New York	2002
2	Handbook for Building Engineers in Metric systems, NBC, New Delhi, 2005.			

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Lighting in Architectural Design	Philips	McGraw-Hill, New York,	2000.
2	Air-conditioning and Energy Conservation	A.F.C. Sherratt	The Architectural Press, London	2005.
3	National Building Code.			

SEMESTER-VII

17BECE7E-- PROFESSIONALELECTIVE IV 3 0 0 3 100

TOTAL: 45HRS

SEMESTER-VII

OPEN ELECTIVE I 3 0 0 3 100

TOTAL: 45HRS

SEMESTER-VII

OPEN ELECTIVE II 3 0 0 3 100

TOTAL: 45HRS

SEMESTER-VII

17BECE711 ESTIMATION, QUANTITY SURVEYING AND VALUATION 2 0 2 3 100

OBJECTIVES:

1. To know the importance of preparing the types of estimates under different conditions.
2. To know about the rate analysis and bill preparations.
3. To study about the specification writing.
4. To understand the valuation of land and buildings.
5. To gain the knowledge of contracts.
6. To rate analysis and bill preparations

COURSE OUTCOMES

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

1. Apply different types of estimates in different situations.
2. Carry out analysis of rates and bill preparation at different locations.
3. Demonstrate the concepts of specification writing.
4. Carry out valuation of assets.
5. The rate analysis and bill preparations
6. The types of estimates under different conditions

LIST OF EXPERIMENTS

INTRODUCTION

Types of estimates – Units of measurements – Methods of estimates – Advantages - cost analysis.

ESTIMATE OF BUILDINGS: Detailed and abstract estimate –Calculation of quantities by centre line method – Long wall – Short wall method – Load bearing and framed structures.

ESTIMATE OF OTHER STRUCTURES: Estimating of septic tank, soak pit – water supply pipe line – sewer line –estimate of bituminous and cement concrete roads – estimate of retaining walls – culverts.

RATE, SPECIFICATIONS AND TENDERS: Data – Schedule of rates – Analysis of rates – Specifications –Detailed and general specifications – Tenders – Contracts – Types of contracts – Arbitration and legal requirements.

VALUATION &REPORT PREPARATION: Necessity – Basics of value engineering – Capitalised value – Depreciation – Escalation – Value of building – Calculation of Standard rent – Mortage – Lease -Principles for report preparation – report on estimate of residential building , Culvert , Roads , Water supply and sanitary installations , Tube wells and Open wells.

TOTAL: 45HRS

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Estimating and Costing in	Dutta, B.N	UBS Publishers & Distributors	2013

	Civil Engineering		Pvt. Ltd, Delhi	

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Civil Estimating and Costing	Mahajan	SathyaPrakashan,New Delhi	2012
2	Civil Estimating Costing and Valuation	Aggarwal	B.D Kataria and Sons, Ludhiana	2012
3	A Text Book of Estimating and Costing (Civil	Kohli, D.D and Kohli, R.C	S.Chand& Company Ltd, Uttar Pradesh	2012

WEBSITES:

- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/
- http://icevirtuallibrary.com/
- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

SEMESTER VII

17BECE712 STRUCTURAL DETAILING AND DRAWING LABORATORY-CADD

0 0 3 2 100

OBJECTIVE

1. To learn the software skills in structural engineering.
2. To learn the software skills in the field of transportation engineering.
3. To learn the software skills in water resources engineering.
4. To apply the software skills in the field of transportation engineering
5. To apply the software skills in the field of water resource engineering.
6. To apply the software skills in the field of geotechnical engineering.

COURSE OUTCOMES

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

1. Apply the software skills in the field of structural engineering.
2. Apply the software skills in the field of transportation engineering
3. Apply the software skills in the field of water resource engineering.
4. Apply the software skills in the field of geotechnical engineering.
5. Learn the software skills in structural engineering.
6. Learn the software skills in the field of transportation engineering.

Concrete structures:

1.Design and detailing of R.C (Residential building)
2.Design and detailing of frame structure
3.Design and detailing of underground structure

The drawing includes

Design and detailing of RC beams (Simple Beam/Lintel, 'T' Beam floor)
Design and detailing of RC slabs
Design and detailing of RC columns
Design and detailing of RC footings
Design and detailing of RC retaining walls

Steel structures:

1. Design and detailing of industrial structures

The drawing includes

Design and detailing of beam column connection
Design and detailing of column and gusset plate connection
Design and detailing of trusses
Design and detailing of beams
Design and detailing of columns
Design and detailing of simple beam to column connections

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Structural Design & Drawing – Reinforced Concrete and Steel	N. Krishna Raju	University Press, Chennai	2012

SEMESTER-VII

17BECE791 PROJECT WORK-PHASE I0 0 8 4 100

INTENDED OUTCOMES

1. To work in convenient groups of not more than four members in a group on a project involving theoretical and experimental studies related to Civil Engineering.
2. Each student shall finally produce a comprehensive report covering background information, literature Survey, problem statement, Project work details and conclusions.
3. This experience of project work shall help the student in expanding his / her knowledge base
4. Will provide opportunity to utilise the creative ability and inference capability.
5. Students will gain the presentation skills.
6. To explain his/her project to the external examiner and can publish the projects in a reputed journal.

SEMESTER-VII

VALUE ADDED COURSE

17BECE751 COURSE ORIENTED PROJECT-III 00 3 - 100

COMPUTER AIDED DESIGN LABORATORY

OBJECTIVE

1. Students should be trained about the general purpose analysis and design software commands and input instructions and command formats and analysis of various structures.
2. They should also get familiar with various unit systems, co-ordinate systems and various structural analysis.

LIST OF EXPERIMENTS

1. Model generation using Node/Beam Editor
2. Assigning Properties, Supports, Loads Analysis and design for 2 storey building
3. Analysis of Framed Structure and Applying Floor Loads and Wind load for 3 storey building
4. Analysis of Framed Structure and Applying Seismic Analysis for 3 storey building
5. Analysis of 3 storey school building and generate the stress diagrams on each beam and column
6. Analysis of Retaining Wall

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Structural Design &Drawing – Reinforced Concrete and Steel	N. Krishna Raju	University Press, Chennai	2012

SEMESTER VIII

SEMESTER-VIII

17BECE8E--	**PROFESSIONAL ELECTIVE V**	**3 0 0**	**3100**

TOTAL: 45HRS

SEMESTER-VIII

17BECE8E--	**PROFESSIONAL ELECTIVE VI**	**3 0 0**	**3100**

TOTAL: 45HRS

SEMESTER-VIII

17BECE891	**PROJECT WORK& VIVA VOCE**	**0 0 32 16 300**

OBJECTIVE

1. To work in convenient groups of not more than four members in a group on a project involving theoretical and experimental studies related to Civil Engineering.
2. Each student shall finally produce a comprehensive report covering background information, literature Survey, problem statement, Project work details and conclusions.
3. This experience of project work shall help the student in expanding his / her knowledge base
4. Will provide opportunity to utilise the creative ability and inference capability.
5. Students will gain the presentation skills.
6. To explain his/her project to the external examiner and can publish the projects in a reputed journal.

LIST OF ELECTIVES

PROFESSIONAL ELECTIVES (PE)

17BECEE001 HYDROLOGY 3 0 0 3 100

OBJECTIVE:

1. To know the types of aquifers
2. To understand the surface and subsurface investigation in detail
3. To integrate the fundamental and basic knowledge of ground water movement
4. To understand the process of sea water intrusion and recharge
5. To introduce the different model studies
6. To visualize the occurrence and movement of groundwater.

COURSE OUTCOMES

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

1. Identify types of aquifers.
2. Carry out surface and subsurface investigation to locate groundwater.
3. Visualize the occurrence and movement of groundwater.
4. Select suitable type of ground water recharge.
5. Assess sea water intrusion and its control.
6. Understand the process of sea water intrusion and recharge

UNIT I **9**

Precipitation: Hydrologic cycle – Types of precipitation – Forms of precipitation – Measurement of Rainfall – Spatial measurement methods – Temporal measurement methods – Frequency analysis of point rainfall – Intensity, duration, frequency relationship – Probable maximum precipitation.

UNIT II **9**

Abstraction From Precipitation: Losses from precipitation – Evaporation process – Reservoir evaporation – Infiltration process – Infiltration capacity – Measurement of infiltration – Infiltration indices – Effective rainfall.

UNIT III **9**

Hydrographs: Factors affecting Hydrograph – Base flow separation – Unit hydrograph – Derivation of unit hydrograph – S curve hydrograph – Unit hydrograph of different deviations - Synthetic Unit Hydrograph

UNIT IV **9**

Floods And Flood Routing: Flood frequency studies – Recurrence interval – Gumbel's method – Flood routing – Reservoir flood routing – Muskingum's Channel Routing – Flood control

UNIT V **9**

Ground Water 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.

TOTAL: 45 HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Engineering Hydrology	Subramanya, K	Tata McGraw-Hill PublishingCo,Ltd.New Delhi	2000
2	Hydrology	Raghunath, H.M	Wiley Eastern Ltd,New York	2000

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Hydrology for Engineers	Chow, V.T. and Maidment	McGraw-Hill Inc., Ltd, New Delhi	2000
2	Hydrology	Singh, V.P	McGraw-Hill Inc.,Ltd. New Delhi	2000

WEBSITES:

- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/
- http://icevirtuallibrary.com/
- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

17BECEE002 CARTOGRAPHY 3 0 0 3 100

OBJECTIVE:

1. To develop an understanding of cartography (earth-map relationship, map design, sources of data)
2. To expose the students to the integration of computers, automated surveying, remote sensing, GPS, and GIS for the cartographic process.
3. To get the sources of data's from maps.
4. To produce map.
5. To learnt the Nature and history of cartography
6. To learn about the Earth-Map relation

COURSE OUTCOMES

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

1. learnt the Nature and history of cartography
2. Earth-Map relation
3. Sources of data
4. Perception and design
5. Map production
6. Reproduction.

UNIT I **9**

Introduction: Cartography today - Nature of Cartography - History of Cartography - Graticules – Cartometry – applications.

UNIT II **9**

Earth: Earth-Map Relations - Basic Geodesy - Map Projections, Scale, Reference and Coordinate system - Transformation - Basic Transformation - Affin Transformation.

UNIT III **9**

Sources of Data: Sources of data - Ground Survey and Positioning - Remote Sensing data collection - Census and sampling - data - Models for digital cartographic information, Map digitizing.

UNIT IV **9**

Perception and Design: Cartographic design - Color theory and models - Color and pattern creation and specification - Color and pattern - Typography and lettering the map - Map compilation.

UNIT V **9**

Cartography Abstract: Selection and Generalisation Principles - Symbolisation - Topographic and thematic maps - Map production and Reproduction - Map series.

TOTAL: 45 HRS

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Basic Cartography for students and Technicians. Vol. I, II and III	Anson.R.W.and F.J. Ormeling	Elsevrir Applied SciencePublishers 2nd Edition,Canada	2002

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Elements of Cartography, Sixth Edition	Arthur, H. Robinson Et al	John Wiley and Sons, New York	2001
2	Cartography: Visualisation and spatial data	Kraak M J and Ormeling F J	Prentice Hall,Canada	2013

WEBSITES:

- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/
- http://icevirtuallibrary.com/
- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

17BECEE003 COMPOSITE MATERIALS AND STRUCTURES 3 0 0 3 100

OBJECTIVE:

1. To study the behaviour of composite materials and to investigate the failure and fracture characteristics.
2. To understand the fabrication, analysis and design of composite materials & structures
3. To discuss the benefits and disadvantages of using composites in aerospace structures
4. To describe current and emerging applications of composites in the aerospace industry
5. To calculate the elastic and strength properties of unidirectional laminates using micromechanics theory
6. To select the most appropriate manufacturing process for fabricating composite components

COURSE OUTCOMES

1. Discuss the benefits and disadvantages of using composites in aerospace structures
2. Describe current and emerging applications of composites in the aerospace industry
3. Calculate the elastic and strength properties of unidirectional laminates using micromechanics theory
4. Select the most appropriate manufacturing process for fabricating composite components
5. Demonstrate understanding of the different materials (fibers, resins, cores) used in composites
6. Behaviour of composite materials and to investigate the failure and fracture characteristics.

UNIT I INTRODUCTION 9

Introduction to Composites, Classifying composite materials, commonly used fiber and matrix constituents, Composite Construction, Properties of Unidirectional Long Fiber Composites and Short Fiber Composites.

UNIT II STRESS STRAIN RELATIONS 9

Concepts in solid mechanics, Hooke's law for orthotropic and anisotropic materials, Linear Elasticity for Anisotropic Materials, Rotations of Stresses, Strains, Residual Stresses

UNIT III ANALYSIS OF LAMINATED COMPOSITES 9

Governing equations for anisotropic and orthotropic plates. Angle-ply and cross ply laminates – Static, Dynamic and Stability analysis for Simpler cases of composite plates, Interlaminar stresses.

UNIT IV FAILURE AND FRACTURE OF COMPOSITES 9

Netting Analysis, Failure Criterion, Maximum Stress, Maximum Strain, Fracture Mechanics of Composites, Sandwich Construction.

UNIT V APPLICATIONS AND DESIGN **9**

Metal and Ceramic Matrix Composites, Applications of Composites, Composite Joints, Design with Composites, Review, Environmental Issues

TOTAL: 45 HRS

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	The Analysis of laminated Composite Structures	Calcote, L R	Von – Noastrand Reinhold Company, New York	1998
2	Mechanics of Composite Materials	Jones, R.M	McGraw-Hill, Kogakusha Ltd., Tokyo	1985.

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Analysis and Performance of Fibre Composites	Agarwal, B.D., and Broutman, L.J	**John Wiley and sons. Inc., New York**	1995.
2	Handbook on Advanced Plastics and Fibre Glass	Lubin, G	Von Nostrand Reinhold Co., New York,	1989.

17BECEE004 GROUND WATER ENGINEERING 3 0 0 3 100

OBJECTIVES:

1. To introduce the student to the principles of Groundwater governing Equations and Characteristics of different aquifers,
2. To understand the techniques of development and management of groundwater.
3. To understand aquifer properties and its dynamics after the completion of the course.
4. It gives an exposure towards well design and practical problems of groundwater aquifers.
5. To understand the importance of artificial recharge and groundwater quality concepts.
6. To know the State of aquifers

COURSE OUTCOMES

1. Students will be able to understand aquifer properties and its dynamics after the completion of the course.
2. It gives an exposure towards well design and practical problems of groundwater aquifers.
3. Students will be able to understand the importance of artificial recharge and groundwater quality concepts.
4. Understand the techniques of development and management of groundwater.
5. Understand aquifer properties and its dynamics after the completion of the course.
6. Exposure towards well design and practical problems of groundwater aquifers.

UNIT I **9**

Fundamentals of Ground Water: Introduction – Characteristic of Ground water – Distribution of water - ground water column –Permeability - Darcy's Law - Laboratory permeability test - Types of aquifers - Hydrogeological Cycle – water level fluctuations.

UNIT II **9**

Hydraulics of Flow: Storage coefficient - Specific field - Heterogeneity and Anisotrophy - Transmissivity - Governing equations of ground water flow - Steady state flow - DupuitForchheimer assumptions - Velocity potential - Flow nets

UNIT III **9**

Estimation Of Parameters: Transmissivity and Storativity – Pumping test - Unsteady state flow - Thiess method - Jacob method - Image well theory – Effect of partial penetrations of wells - Collectors wells.

UNIT IV **9**

Ground Water Development: Infiltration gallery - Conjunctive use - Artificial recharge -Safe yield -Yield test – Geophysical methods – Selection of pumps.

UNIT V **9**

Water Quality: Ground water chemistry - Origin, movement and quality - Water quality standards - Saltwater intrusion –Environmental concern.

TOTAL : 45 HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing

1	Ground Water Hydrology	Raghunath H.M	Wiley Eastern Ltd..	2000
2	Ground Water Hydrology	Todd D.K	John Wiley and Sons	2000

REFERENCES:

Sl.No	**Title of Book**	**Author of Book**	**Publisher**	**Year of Publishing**
1	Ground Water Resource Evaluation	Walton.C	McGraw-Hill Publications	2002

WEBSITES:

- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/
- http://icevirtuallibrary.com/
- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

17BECE005 IRRIGATION ENGINEERING 3 0 0 3 100

OBJECTIVES:

1. To understand the basic types of irrigation, irrigation standards and crop water assessment
2. To study the different aspects of design of hydraulic structures
3. To provide knowledge on various hydraulic structures such as energy dissipaters, head and cross regulators, canal falls and structures involved in cross drainage works
4. To understand the analysis of seepage and hydraulic jump
5. To design different types of dams.
6. To design various river training methods

Course outcomes

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

1. Find the crop water requirement for various crops in the command area.
2. Understand the complete design of Dams and channel systems.
3. Understand the different types of cross drainage works.
4. Design various river training methods.
5. Understand the analysis of seepage and hydraulic jump
6. Design different types of dams.

UNIT I **9**

INTRODUCTION: Irrigation – Need and mode of irrigation – Merits and demerits of irrigation – environmental impacts of irrigation-History of irrigation development in India-Classification of irrigation projects Crop and crop seasons – consumptive use of water – Duty – Factors affecting duty – Irrigation efficiencies – Planning and Development of irrigation projects.

UNIT II **9**

IRRIGATION METHODS: Requirement of an irrigation method- sub surface irrigation-surface irrigation-burried irrigation-seepage line irrigation- Canal irrigation – Lift irrigation – Tank irrigation – Flooding methods – Merits and demerits – Sprinkler irrigation – Drip irrigation – barrow pit method- participatory approach – water user associations- social aspects in water pricing .

UNIT III **9**

DIVERSION AND IMPOUNDING STRUCTURES: Weirs – elementary profile of a weir – weirs on pervious foundations - Types of impounding structures - Tanks, Sluices and Weirs – Gravity dams – Earth dams – Arch dams – Spillways – Factors affecting location and type of dams – Forces on a dam – Hydraulic design of dams.

UNIT IV **9**

CANAL IRRIGATION: Design of irrigation channels - Alignment of canals – Classification of canals –Typical capacity –statement of roughness coefficient- Maximum and minimum permissible velocity - Canal drops – side slopes of banks- side slopes of canal- Hydraulic design of drops – Cross drainage works – Hydraulic design of cross drainage works – Canal Head works – Canal regulators – River Training works.

UNIT V **9**

IRRIGATION WATER MANAGEMENT: Need for optimisation of water use – Minimizing irrigation water losses – On farm development works – Percolation ponds – Participatory irrigation management – Water users associations – Changing paradigms in water management – Performance evaluation. Selection of site for hydropower plant- essential data for waterpower studies- requirement of water for hydal power.

TOTAL: 45 HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Irrigation Engineering	Asawa, G.L	New Age International Publishers, New Delhi	2012
2	Irrigation Engineering	Sharma R.K., and Sharma T.K	S. Chand and company, New Delhi	2011
3	Irrigation Engineering	Gupta, B.L, & Amir Gupta	SatyaPraheshan, New Delhi	2011

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Irrigation Water Management (Principles & Practices)	Dilip Kumar Majumdar	Prentice Hall of India (P), Ltd, New york	2004
2	Irrigation Engineering	Basak, N.N	Tata McGraw-Hill Publishing Co,New Delhi	2009
3	Irrigation Engineering	Garg, S.K.,	Tata McGraw-Hill Publishing Co,New Delhi	2002

WEBSITES:

- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/

17BECEE006 FOUNDATION ENGINEERING 3 0 0 3 100

OBJECTIVE:

1. To explain the analysis of sheet pile wall under different support conditions
2. To explain overall stability analysis of well foundation
3. To explain fundamentals of soil dynamics and its application to machine foundation analysis including codal provisions
4. To explain problems related to expansive soils and solution to overcome
5. To explain the concept of slope stability analysis for various slope conditions including graphical methods
6. To analyse the stability of any kind of slope by using both theoretical and graphical methods.

COURSE OUTCOMES

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

1. Analyse and design any kind of sheet pile wall system including coffer dam.
2. Analyse and design well foundation including complete stability analysis.
3. Estimate soil parameters under dynamic conditions including machine foundations.
4. Design a suitable foundation system for any kind of problematic soils.
5. Analyse the stability of any kind of slope by using both theoretical and graphical methods.
6. Know the fundamentals of soil dynamics and its application to machine foundation analysis including codal provisions

UNIT I **9**

Site Investigation And Selection Of Foundation: Scope and Objectives – Methods of exploration - Borings for Exploration – Wash boring and rotatory drilling – Depth of boring - Sampling – Representative and undisturbed sampling – sampling techniques – Split spoon sampler, Thin tube sampler, Stationary piston sampler – Penetration tests (SPT and SCPT) – Core cutter method, its significances and applications- Selection of foundation based on soil condition.

UNIT II **9**

Shallow Foundation: Introduction – Location and depth of foundation — bearing capacity of shallow foundation on homogeneous deposits – Terzaghi's formula and BIS formula – factors affecting bearing capacity – problems - Bearing Capacity from insitu tests (SPT, SCPT and plate load) –Settlement – Components of settlement – Methods of minimizing settlement, differential settlement - subsoil stabilization - codalprovisions .

UNIT III **9**

Footings and Rafts: Types of foundation – Raft foundation - Deep foundations – Dewatering system –- Contact pressure distribution below footings & raft - Isolated and combined footings – Types – proportioning - Mat foundation – Types – use - proportioning – Floating foundation.

UNIT IV **9**

Piles: Types of piles and their function – Factors influencing the selection of pile – Load Carrying capacity of single pile in granular and cohesive soil - Static formula - dynamic formulae (Engineering News and Hiley's) – Negative skin friction –- Settlement of pile groups – Under reamed piles .

UNIT V **9**

Retaining Walls: Plastic equilibrium in soils –Types of Retaining Wall – Active and Passive states – Rankine's theory – cohesionless and cohesive soil –Coloumb's wedge theory – Graphical methods (Rebhann and Culmann) - Pressure on the wall due to line load – Stability of Retaining walls.
Introduction to Geo textiles – applications.

TOTAL: 45 HRS

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Soil Mechanics and Foundations	Punmia B.C	Laxmi Publications Pvt. Ltd., New Delhi	2012

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Basic and Applied Soil Mechanics	GopalRanjan and Rao A.S.R.	Wile Eastern Ltd., New Delhi, India	2012
2	Foundation Engineering Standard	Varghese P C	Publishers Distributors New Delhi	2005
3	Soil Mechanics and Foundations Engineering	Arora K.R	Published by A.K Jain, New Delhi	2012

WEBSITES:

- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/
- http://icevirtuallibrary.com/
- http://www.ice.org.uk/

17BECEE007 URBAN WATER RESOURCES MANAGEMENT 3 0 0 3 100

OBJECTIVE:

1. To identify and quantify the hydrological data inputs necessary for various design applications in the field of water resources.
2. To introduce to the quantitative relationship that explains the understanding of hydrological processes in answering scientific and water-resources-management questions.
3. To know about urban hydrological cycle
4. To gather knowledge of urban water resources management models
5. To find the different and Effective urban water user organizations
6. To get the knowledge of Operation and maintenance of hydraulic structures.

COURSE OUTCOMES

Students will be able to understand

1. About urban hydrological cycle,
2. urban water resources management models,
3. urban storm water management,
4. Effective urban water user organizations,
5. Operation and maintenanceof hydraulic structures.
6. Quantify the hydrological data inputs necessary for various design applications in the field of water resources.

UNIT IURBAN HYDROLOGIC CYCLE 9

Water in the urban eco-system – Urban Water Resources – Major problems – Urban hydrological cycle – Storm water management objectives and limitations – Storm water policies – Feasibility consideration.

UNIT II URBAN WATER RESOURCES MANAGEMENT MODELS 9

Types of models – Physically based – conceptual or unit hydrograph based – Urban surface runoff models – Management models for flow rate and volume control rate – Quality models.

UNIT IIIURBAN STORM WATER MANAGEMENT 9

Storm water management practices (Structural and Non-structural Management measures) – Detention and retention concepts – Modeling concept – Types of storage – Magnitude of storage – Hydraulic analysis and design guidelines – Flow and storage capacity of urban components – Temple tanks.

UNIT IV MASTER PLANS 9

Planning and organizational aspects – Inter dependency of planning and implementation of goals and measures – Socio – economics financial aspects – Potential costs and benefit measures – Measures of urban drainage and flood control benefits – Effective urban water user organizations.

UNIT V OPERATION AND MAINTENANCE 9

General approaches to operations and maintenance – Complexity of operations and need for diagnostic analysis – Operation and maintenance in urban water system – Maintenance Management System – Inventories and conditions assessment – Social awareness and involvement.

TEXT BOOKS:

Name of the Book	Author Name	Publisher	Year
Role of Water in Urban Ecology	Hengeveld, H. and C. De Voch.t	John Wiley and sons, New York	2000

REFERENCES:

Name of the Book	Author Name	Publisher	Year
Storm Water Management	Martin, P. Wanelista and Yousef, A. Yousef	John Wiley and sons, New York	2000
Urban Water Infrastructure Planning, Management and Operations	Neil S. Grigg	John Wiley and Sons, New York	2002
Storm Water Modelling	Overtens D.E. and Meadows M.E	Academic Press, New York	2001

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

15BECEE008 GROUND IMPROVEMENT TECHNIQUES 3 0 0 3 100

OBJECTIVE:

1. At the end of the course student is expected to identify the problematic soil and suitable suggest remedial measures
2. To understand the different problematic soils and effect of ground improvement techniques.
3. To describe the seepage analysis and suitable dewatering systems for the particular soil conditions.
4. To express the concept of compaction efforts on ground improvement and their installation and working principles.
5. Describe the load transfer mechanism and effect of geotextiles reinforcements in ground improvement.
6. Describe the various stabilization methods for the different types of problematic soils.

COURSE OUTCOMES

1. Student will be in a position to identify and evaluate the deficiencies if any in the deposits of a project area.
2. Capable of providing alternate methods to improve its character suitable to the project, so that the structures built will be stable and serve.
3. Describe the dewatering systems for different soil conditions and their effect.
4. Express the working principlesof different compaction methods on improving weak deposits.
5. Express the design of geo textiles reinforcements for ground improvement.
6. Express the soil stabilization methods for the problematic soils **9**

Introduction: Role of ground improvement in foundation engineering - methods of ground improvement – Geotechnical problems in alluvial, laterite and black cotton soils -Selection of suitable ground improvement techniques based on soil condition.

UNIT II **9**

Drainage and Dewatering: Drainage techniques - Well points - Vacuum and electro osmotic methods - Seepage analysis for two-dimensional flow-fully and partially penetrating slots in homogenous deposits (Simple cases only).

UNIT III **9**

Insitu Treatment of Cohesion less and Cohesive Soils : Insitu densification of cohesion less and consolidation of cohesive soils -Dynamic compaction and consolidation – Vibro flotation - Sand pile compaction - Preloading with sand drains and fabric drains – Stone columns – Lime piles - Installation techniques only - relative merits of various methods and their limitations.

UNIT IV **9**

Earth Reinforcement: Concept of reinforcement - Types of reinforcement material - Applications of reinforced earth – use of Geotextiles for filtration, drainage and separation in road and other works.

UNIT V **9**

Grout Techniques: Types of grouts - Grouting equipment and machinery - Injection methods - Grout monitoring – Stabilisation with cement, lime and chemicals - Stabilization of expansive soils.

TOTAL: 45 HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Ground Improvement Techniques	Purushothama Raj, P	Tata McGraw-Hill Publishing Company, New Delhi	2012

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Ground Improvement	Michael P. Moseley, Klaus Kirsch	Blockie Academic and Professional, Chapman and Hall, Glasgow	2004
2	Design with Geosynthetics,	Koerner, R.M.	Prentice Hall, New	2002

	(3rd Edition)		Jersey	
3	Soil Reinforcement with Geotextiles	Khedkar, M. S.,andMandal, J. N.	CIRIA special publication, London	2009
4	Construction and Geotechnical Methods in Foundation Engineering	Koerner R.M	McGraw-Hill, New Delhi	2000

WEBSITES:

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- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/

17BECEE009 PREFABRICATED STRUCTURES 3 0 0 3 100

OBJECTIVE:

1. To impart knowledge to students on modular construction, industrialized construction
2. To design of prefabricated elements and construction methods.
3. To know the different components of Prefabricated structures.
4. To design join flexibility.
5. To understand the assembling and dismantling of prefabricated components
6. To understand the joining techniques in prefabrication

COURSE OUTCOMES

1. The student shall be able to design some of the prefabricated elements
2. The procedure of prefabrication
3. Have the knowledge of the construction methods in using these elements.
4. Design join flexibility.
5. Familiarize with joining techniques used for prefabrication.
6. Abnormal loads which are hazardous to the prefabricated structures.

UNIT I **9**

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

UNIT II **9**

Prefabricated Components: Behavior of structural components – Large panel constructions – Construction of roof and floor slabs – Wall panels – Columns – Shear walls

UNIT III **9**

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.

UNIT IV **9**

Joint in Structural Members: Joints for different structural connections – Dimensions and detailing – Design of expansion joints

UNIT V **9**

Design for Abnormal Loads: Progressive collapse – Code provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones - Importance of avoidance of progressive collapse.

TOTAL : 45 HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	CBRI, 1990, Building materials and components, India			
2	Knowledge based process	Gerostiza C.Z.,	Academic Press Inc.,	2012

	planning for construction and manufacturing	Hendrikson C. and RehatD.R		

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Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Manual of precast concrete construction, Vols. I, II and III, Bauverlag, GMBH	Koncz T	Bauverlag, GMBH	1971
2	Structural design manual,Precast concrete connection details 1978.Society for the studies in the use of precast concrete Netherland BetorVerlag			

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- http://www.engineering-software.com/ce/

17BECEE010 SOIL POLLUTION ENGINEERING 3 0 0 3 100

OBJECTIVE:

The students will

1. To develop an understanding of the classification, sources and effects of pollutants
2. To understand the fundamentals of meteorology
3. To study the principles and equipment description of control technologies
4. To review the sources and control of soil pollution.
5. To understand the sources and effects of key types of environmental pollutants
6. To have insight into fundamentals of meteorology

COURSE OUTCOMES

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

1. Understand the sources and effects of key types of environmental pollutants
2. Have insight into fundamentals of meteorology
3. Appreciate different pollution control strategies
4. Understand indoor air pollution and be aware of the control technologies
5. Develop an understanding of the classification, sources and effects of pollutants
6. Understand the fundamentals of meteorology

UNIT I PHYSICS AND CHEMISTRY OF SOIL 9

Soil formation – composition – soil fabric – mass-volume relationship – Index properties and soil classification – hydraulic and consolidation characteristics – Chemical properties – soil pH – Surface charge and point of zero charge – Anion and Cation exchange capacity of clays– Specific surface area- bonding in clays-soil pollution-factors governing soil-pollutant interaction.

UNIT II INORGANIC AND ORGANIC GEOCHEMISTRY 9

Inorganic geochemistry – Metal contamination – Distribution of metals in soils – Geochemical processes controlling the distribution of metals in soils – Chemical analysis of metal in soil – Organic geochemistry – Organic contamination – Distribution of NAPLs in soils – Process controlling the distribution of NAPLs in soil – Chemical analysis of NAPLs in soils.

UNITIIICONTAMINANTFATEANDTRANSPORTINSOIL 9

Transport processes – advection – diffusion – dispersion – chemical mass transfer processes – sorption and desorption – precipitation and dissolution – oxidation and reduction – acid base reaction – complexation – ion exchange – volatilization – hydrolysis – biological process-microbial transformation of heavy metals.

UNIT IV GROUND IMPROVEMENT TECHNIQUES IN WASTE MANAGEMENT 9

Role of Ground Improvement-Drainage and Ground Water Lowering-Electro osmotic Methods-Diaphragm walls-Thermal and Freezing methods - Insitu Densification - Deep Compaction - Dynamic Compaction -Blasting Sand piles pre-loading with sand drains-Stone Columns Lime piles-

Earth reinforcement -rock bolts Cables and guniting Geotextiles as reinforcement Filtration. Drainage and Erosion control.

UNIT V SOIL REMEDIATION TECHNOLOGIES 9

Contaminated site characterization – Containment – Soil vapour extraction - Soil washing – Solidification and Stabilization – Electro-kinetic remediation – Thermal desorption – Vitrification – In-situ and Ex-situ Bioremediation – Phytoremediation – Soil fracturing – Biostimulation – Bioaugmentation –Chemical oxidation and reduction.

TOTAL : 45 HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	An Introduction to the Environmental Physics of Soil, Water and Water Sheds	Calvin Rose	Cambridge University Press, London	2004
2	Reclamation of Contaminated Land	Paul Nathanail C. and Paul Bardos R	John Wiley & Sons Limited, New York	2004

REFERENCES:

Name of the Book	Author Name	Publisher	Year
Geo-Environmental Engineering : Site Remediation, Water Contaminant and Emerging Water Management Technologies	Hari D. Sharma and Krishna R. Reddy	John Wiley & Sons Limited, New York	2004
Groundwater Geochemistry : Fundamentals and Applications to Contamination	William J. Deutsch	Lewis Publishers, London.	2002

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

17BECEE011 RAILWAYS, AIRPORTS AND HARBOURS 3 0 0 3 100

OBJECTIVE:

1. To expose the students to Railway planning, design, construction and maintenance and planning and design principles of Airports and Harbours.
2. Understand the history and development, role of railways, railway planning and development based on essential criteria's.
3. Learn different types of structural components, engineering properties of the materials, to calculate the material quantities required for construction
4. Understand various aspects of geometric elements, points and crossings, significance of maintenance of tracks.
5. Design and plan airport layout, design facilities required for runway, taxiway and impart knowledge about visual aids
6. Apply design features of tunnels, harbours, dock and necessary navigational aids; also expose them to various methods of tunneling and tunnel accessories.

COURSE OUTCOMES

1. At the end of this course the students should have learnt the Railway planning and design, railway track construction, Maintenance and operation, Airport planning and designing,
2. Airport layout, visual aids and air traffic control, Harbour engineering and other modes of transport.
3. cquires capability of choosing alignment and also design geometric aspects of railway system, runway and taxiway.
4. Suggest and estimate the material quantity required for laying a railway track and also will be able to determine the hauling capacity of a locomotive.
5. Develop layout plan of airport, harbor, dock and will be able relate the gained knowledge to identify required type of visual and/or navigational aids for the same.
6. Apply the knowledge gained to conduct surveying, understand the tunneling activities.

UNIT I **9**

Railway Planning And Design: Role of Indian Railways in National Development - Engineering Surveys for Track Alignment – Obligatory points - Permanent Way, its Components and Functions of each Component: Rails - Types of Rails, Rail Fastenings, Concept of Gauges, Coning of Wheels, Creeps and kinks Sleepers-Density- Ballasts - Materials, Ballast less- Tracks -Geometric Design of Railway Tracks – Gradients and Grade Compensation, Super-Elevation, Widening of Gauges in Curves, Transition Curves, Horizontal and Vertical Curves (Derivations of Formulae and Problems)

UNIT II **9**

Railway Track Construction, Maintenance And Operation: Points and Crossings - Design of Turnouts, Working Principle -Signaling, Interlocking and Track Circuiting-Construction & Maintenance – Conventional, Modern methods and Materials, Track Drainage-Track Modernization– Automated maintenance and upgrading, Technologies, Re-laying of Track -Lay outs of Railway Stations and Yards, Rolling Stock, Tractive Power, Track Resistance, Level Crossings

UNIT III **9**

Airport Planning And Design: Advantages and Limitations of Air Transport, Components of Airports- Airport Planning – Air traffic potential, Site Selection, Design of Components- Institutional arrangements- Runway Design- Orientation, Cross wind Component, Wind rose Diagram (Problems), Geometric Design and Corrections for Gradients (Problems), Drainage-Taxiway Design

– Geometric Design Elements, Minimum Separation Distances, Design Speed-Airport Drainage - Airport Zoning - Clearance over Highways and Railways

UNIT IV **9**

Airport Layouts, Visual Aids, And Air Traffic Control: Airport Layouts – Apron, Terminal Building, Hangars, Motor Vehicle Parking Area and Circulation Pattern, Case studies of Airport Layouts-Airport Buildings – Primary functions, Planning Concept, Principles of Passenger Flow, Passenger Facilities -Visual Aids – Runway and Taxiway Markings, Wind Direction Indicators, Runway and Taxiway Lightings-Air Traffic Control – Basic Actions, Air Traffic Control Network-Helipads, Hangars, Service Equipments.

UNIT V **9**

Harbour Engineering & Other Modes Of Transport: Harbours, Ports, Docks, Tides and Waves, Littoral Drift, Sounding, Area, Depth, Satellite Ports-Requirements and Classification of Harbours– Speed of water, Dredging, Range of Tides, Waves and Tidal Currents, Soundings, Anchoring Grounds-Winds & Storms, Position and Size of Shoals-Shore Considerations- Coast Lines- Dry and Wet Docks,, Planning and Layouts- Position of Light Houses, Navigating -Terminal Facilities – Port Buildings, Warehouse, Transit Sheds -Coastal Structures- Piers, Breakwaters Spring Fenders-Coastal Shipping, Inland Water Transport and Container Transportation-Pipe Ways, Rope Ways,

TOTAL : 45 HRS

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	A Course in Railway Engineering	SaxenaSubhash C and SatyapalArora	DhanpatRai and Sons, Delhi	2000
2	Airport Planning and Design	Khanna S K, Arora M G and Jain S S	Nemchand and Brothers, Roorkee	2002
3	A Course in Docks and Harbour Engineering	S P Bindra, 1993	DhanpatRai and Sons,Delhi	2002

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Railway Engineering	Rangwala	Charotar Publishing House,Gujarat	1995
2	Airport Engineering	Rangwala	Charotar Publishing House,Gujarat	1996

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2. www.nptel.com
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15BECEE012 REPAIR AND REHABILITATION OF STRUCTURES 3 0 0 3 100

OBJECTIVE:

1. To make the students to gain the knowledge on quality of concrete, durability aspects, causes of deterioration.
2. To the assessment of distressed structures, repairing of structures and demolition procedures.
3. To gain the knowledge of available techniques and their application for strengthening or upgrading existing structural system
4. To conduct field monitoring and non-destructive evaluation of concrete structures.
5. To have a brief knowledge on various Nondestructive testing's.
6. To gain some knowledge on the different materials used for maintenance of structures.

COURSE OUTCOMES

1. Students must gained knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.
2. Assessment of distressed structures, repairing of structures and demolition procedures.
3. Available techniques and their application for strengthening or upgrading existing structural system
4. Conducting field monitoring and non-destructive evaluation of concrete structures.
5. Knowledge on various Nondestructive testing's.
6. Different materials used for maintenance of structures.

UNIT – I INTRODUCTION 9

Quality assurance for concrete construction as built concrete properties strength, permeability, thermal properties and cracking. Effects due to climate, temperature, chemicals, wear and erosion, Design and construction errors.

UNIT – II DURABILITY OF STRUCTURES 9

Corrosion mechanism – diagnosis- causes and effects - cover thickness and cracking, measurements for corrosion - methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings, cathodic protection.

UNIT - III MAINTENANCE AND REPAIR STRATEGIES 9

Definitions: Maintenance, repair and rehabilitation, Facets of Maintenance importance of Maintenance Preventive measures on various aspects Inspection, Assessment procedure for evaluating a damaged structure causes of deterioration - testing techniques.

UNIT - IV MATERIALS FOR REPAIR 9

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete. eliminators and polymers coating for rebars during repair foamed concrete, mortar and dry pack, vacuum concrete.

UNIT - V TECHNIQUES FOR REPAIR AND REPAIR OF STRUCTURES 9

Non-destructive Testing Techniques , Corrosion protection techniques , Gunite and Shotcrete Epoxy injection, Mortar repair for cracks, shoring and underpinning. Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering wear, fire, leakage, marine exposure Engineered demolition techniques for Dilapidated structures - case studies

TOTAL : 45 HRS

TEXT BOOK

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Repair of Concrete Structures	R.T.Allen and S.C.Edwards	Blakie and Sons, UK,	2011

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Rehabilitation of concrete structures	Dr.B.Vidivelli	Standard publishers, Chennai.	2011

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17BECEE013 MUNICIPAL SOLID WASTE MANAGEMENT 3 0 0 3 100

OBJECTIVE:

1. To understand the components of solid waste management system
2. To learn about recycling, reuse and reclamation of solid wastes
3. To study the collection, transfer, and transport of municipal solid waste
4. To examine the operation of a resource recovery facility
5. To study the design and operation of a municipal solid waste landfill
6. To understand the chemical principles in the projects undertaken in field of engineering and technology

COURSE OUTCOMES

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

1. Review the components of solid waste management system
2. Be aware of the significance of recycling, reuse and reclamation of solid wastes
3. Develop an insight into the collection, transfer, and transport of municipal solid waste
4. Understand the importance and operation of a resource recovery facility
5. Understand the design and operation of a municipal solid waste landfill
6. the different disposal methods of municipal solid waste

UNIT I **9**

Sources and Types of Municipal Solid Wastes: Sources and types of solid waste - Quantity – factors affecting generation of solid wastes; characteristics – methods of sampling and characterization; Effects of improper disposal of solid wastes – public health effects. Principle of solid waste management – social & economic aspects; Public awareness; Role of NGOs; Legislation.

UNIT II **9**

On-Site Storage &Processing : On-site storage methods – materials used for containers – on-site segregation of solid wastes – public health & economic aspects of storage – options under Indian conditions – Critical Evaluation of Options.

UNIT III **9**

Collection and Transfer : Methods of Collection – types of vehicles – Manpower requirement – collection routes; transfer stations – selection of location, operation & maintenance; options under Indian conditions.

UNIT IV **9**

Off-Site Processing : Processing techniques and Equipment; Resource recovery from solid wastes – composting, incineration, Pyrolysis - options under Indian conditions.

UNIT V **9**

Disposal: Dumping of solid waste; sanitary land fills – site selection, design and operation of sanitary landfills -Landfill liners- Management of leachate and landfill gas- Leachate collection & treatment

TOTAL : 45 HRS

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Integrated Solid Waste Management	George	McGraw-Hill Publishers, New Delhi	2002

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Manual on Municipal Solid Waste Management, 2000,CPHEEO, Ministry of Urban Development, Government of India, New Delhi			
2	Municipal Solid Wastes – problems and Solutions	R.E.Landreth and P.A.Rebers	Lewis Publishers	1997

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- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

17BECEE014 AIR POLLUTION MANAGEMENT 3 0 0 3 100

OBJECTIVE:

The students will

1. Develop an understanding of the classification, sources and effects of pollutants
2. Understand the fundamentals of meteorology
3. Study the principles and equipment description of control technologies
4. Review the sources and control of indoor air pollution.
5. To induce operational considerations under the processing and control monitoring.
6. To apply sampling techniques of gaseous contaminants.

COURSE OUTCOMES

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

1. Understand the sources and effects of key types of environmental pollutants
2. Have insight into fundamentals of meteorology
3. Appreciate different pollution control strategies
4. Understand indoor air pollution and be aware of the control technologies
5. Control noise pollution by specific measurements, standard and preventive measures.
6. Gain the knowledge on the principles and design of control of indoor/ particulate / gaseous air pollutant and its emerging trends

UNIT I **9**

Sources and Effects of Air Pollutants: Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming-ozone layer depletion, Sampling and Analysis – Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants – Principles.

UNIT II **9**

Dispersion of Pollutants: Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate - Atmospheric stability and turbulence – Plume rise – Dispersion of pollutants – Dispersion models – Applications.

UNIT III **9**

Air Pollution Control: Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries.

UNIT IV **9**

Air Quality Management: Air quality standards – Air quality monitoring – Preventive measures - Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement – Environmental Impact Assessment and Air quality

UNIT V **9**

Noise Pollution: Sources of noise pollution – Effects – Assessment - Standards – Control methods - Prevention

TOTAL : 45 HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Air Pollution and Control Technologies	Anjaneyulu, D	Allied Publishers, Mumbai	2002
2	Environmental Pollution Control Engineering	Rao, C.S	Wiley Eastern Ltd., New Delhi	2002
3	Air Pollution Control	Rao M.N., and Rao H. V. N	Tata-McGraw-Hill, New Delhi	2000

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Industrial Air Pollution Control Systems	W.L.Heumann	McGraw-Hill, New York	2001
2	Pollution Control in Process Industries	Mahajan S.P	Tata McGraw-Hill Publishing Company, New Delhi	2005
3	Environmental Engineering Vol. II	Garg, S.K	Khanna Publishers, New Delhi	2005
4	Pollution Control in Process Industries	Mahajan, S.P.	Tata McGraw-Hill, New Delhi	2004

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- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

17BECEE015 PRE-STRESSED CONCRETE STRUCTURES 3 0 0 3 100

OBJECTIVES:

1. To learn the principles, materials, methods and systems of prestressing
2. To know the different types of losses and deflection of prestressed members
3. To learn the design of prestressed concrete beams for flexural, shear and tension and to calculate ultimate flexural strength of beam
4. To learn the design of anchorage zones, composite beams, analysis and design of continuous beam
5. To learn the design of water tanks
6. To design the anchorage zone for post tensioned members.

COURSE OUTCOMES

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

1. Design a pre-stressed concrete beam accounting for losses.
2. Design the anchorage zone for post tensioned members.
3. Design composite members.
4. Design continuous beams.
5. Design water tanks.
6. Design of prestressed concrete beams for flexural, shear and tension and to calculate ultimate flexural strength of beam

UNIT I **9**

Introduction – Theory and Behaviour: Basic concepts – Advantages – Materials required – Systems and methods of prestressing – Analysis of sections – Stress concept – Strength concept – Load balancing concept – Effect of loading on the tensile stresses in tendons – Effect of tendon profile on deflections Factors influencing deflections – Calculation of deflections – Short term and long term deflections - Losses of prestress – Estimation of crack width

UNIT II **9**

Design : Flexural strength – Simplified procedures as per codes – strain compatibility method – Basic concepts in selection of cross section for bending – stress distribution in end block, Design of anchorage zone reinforcement – Limit state design criteria – Partial prestressing – Applications.

UNIT III **9**

Circular Prestressing: Methods of circular prestressing – types classifications - merits and demerits – effects - Design of prestressed concrete tanks – Poles and sleepers –Applications.

UNIT IV **9**

Composite Construction : Various types of composite construction - beams and columns –Analysis for stresses – Estimate for deflections – Flexural and shear strength of composite members

UNIT V **9**

Pre-Stressed Concrete Bridges : General aspects –Methods of pretensioning –methods of post tensioning- pretensioned slabs- pretensioned bridge decks – Post tensioned prestressed bridge decks – Principles of design only.

TOTAL : 45 HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Prestressed concrete	Krishna Raju N	Tata McGraw Hill Company, New Delhi	2012
2	Prestressed concrete	Mallic S.K. and Gupta A.P.,	Oxford and IBH publishing Co. Pvt. Ltd.	2010

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Modern prestressed concrete design	Ramaswamy G.S	Arnold Heinimen, New Delhi	2003
2	Design of prestressed concrete	Raymond Ian Gilbert and Neil Mickleborough	CRC Press	2004
3	Plant Cast precast and prestressed concrete – A design guide	David.A. Sheppard, William.R..and Philips	McGraw Hill,New Delhi.	2003

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- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

17BECEE016 SMART STRUCTURES AND SMART MATERIALS 3 0 0 3 100

OBJECTIVE:

1. To learn the smart materials and structures
2. To learn about the various strain measuring instruments
3. To learn about the sensors and its physical measurements
4. To learn about the signal processing and control systems
5. To know about the sensor technologies in the field of Civil engineering.
6. To gain knowledge of Data Acquisition and Processing

COURSE OUTCOMES

Upon completing of this course, the students should be able to:

1. Learn the types of smart material and its response, Strain measuring techniques, Sensing technology, Actuator techniques ,Signal processing and control systems.
2. Learn about the various strain measuring instruments
3. The sensors and its physical measurements
4. The signal processing and control systems
5. Know about the sensor technologies in the field of Civil engineering.
6. Gain knowledge of Data Acquisition and Processing

UNIT I **9**

Introduction : Introduction to Smart Materials and Structures – Instrumented structures functions and response – Sensing systems – Self diagnosis – Signal processing consideration – Actuation systems and effectors.

UNIT II **9**

Measuring Techniques : Strain Measuring Techniques using Electrical strain gauges, Types – Resistance – Capacitance – Inductance – Wheat stone bridges – Pressure transducers – Load cells – Temperature Compensation – Strain Rosettes.

UNIT III **9**

Sensors : Sensing Technology – Types of Sensors – Physical Measurement using Piezo Electric Strain measurement – Inductively Read Transducers – The LVOT – Fiber optic Techniques. Chemical and Bio-Chemical sensing in structural Assessment – Absorptive
chemical sensors – Spectroscopes – Fibre Optic Chemical Sensing Systems and Distributed measurement.

UNIT IV **9**

Actuators : Actuator Techniques – Actuator and actuator materials – Piezoelectric and Electrostrictive Material – Magneto structure Material – Shape Memory Alloys – Electro archeological Fluids– Electro magnetic actuation – Role of actuators and Actuator Materials.

UNIT V **9**

Signal Processing and Control Systems : Data Acquisition and Processing – Signal Processing and Control for Smart Structures – Sensors as Geometrical Processors – Signal Processing – Control System – Linear and Non-Linear.

TOTAL : 45 HRS

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Smart Structure and Materials	Mel Schwartz	Artech House .Borton. London	2008

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Experimental Stress Analysis	Srinath.L.S	Tata McGraw-Hill, New Delhi	2003
2	Experimental Stress	J. W. Dally.J.W.	Tata McGraw-	2003

	Analysis	& W. F. Riley.	Hill ,New Delhi	

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- http://www.cif.org/
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- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

17BECEE017 FINITE ELEMENT TECHNIQUES 3 0 0 3 100

OBJECTIVE:

1. To apprise the students about the basics of Finite Element theory
2. To know the implementation of computer and its practical applications.
3. To learn basic principles of finite element analysis procedure.
4. To learn the theory and characteristics of finite elements that represent engineering structures.
5. To learn and apply finite element solutions to structural, thermal, dynamic problem.
6. To develop the knowledge and skills needed to effectively evaluate finite element analyses.

COURSE OUTCOMES

1. Students will be in a position to develop computer codes for any physical problems using FE techniques.
2. Understand the concepts behind formulation methods in FEM.
3. Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.
4. Develop element characteristic equation and generation of global equation.
5. Apply suitable boundary conditions to a global equation for bars, trusses, beams, circular shafts, heat transfer, fluid flow
6. Apply suitable boundary conditions to axis symmetric and dynamic problems and solve them displacements, stress and strains induced.

UNIT I **9**

Variational Formulation: General field problems in Engineering – Modelling – Discrete and Continuous models – Characteristics – Difficulties involved in solution – The relevance and place of the finite element method – Historical comments – Basic concept of FEM, Boundary and initial value problems – Gradient and divergence theorems – Functionals – Variational calculus – Variational formulation of VBPS. The method of weighted residuals – The Ritz method.

UNIT II **9**

Finite Element Analysis of One Dimensional Problems : One dimensional second order equations – discrimination of domain into elements – Generalized coordinates approach – derivation of elements equations – assembly of elements equations – imposition of boundary conditions – solution of equations – Cholesky method – Post processing – Extension of the method to fourth order equations and their solutions – time dependent problems and their solutions – example from heat transfer, fluid flow and solid mechanics.

UNIT III **9**

Finite Element Analysis of Two Dimensional Problems : Second order equation involving a scalar-valued function – model equation – Variational formulation – Finite element formulation through generalized coordinates approach – Triangular elements and quadrilateral elements – convergence criteria for chosen models – Interpolation functions – Elements matrices and vectors – Assembly of element matrices – boundary conditions – solution techniques.

UNIT IV **9**

Isoperimetric Elements and Formulation: Natural coordinates in 1, 2 and 3 dimensions – use of area coordinates for triangular elements in - 2 dimensional problems – Isoperimetric elements in 1,2

and 3 dimensional – Largrangean and serendipity elements – Formulations of elements equations in one and two dimensions - Numerical integration.

UNIT V **9**

Applications to Field Problems in Two Dimensionals : Equations of elasticity – plane elasticity problems – axisymmetric problems in elasticity – Bending of elastic plates – Time dependent problems in elasticity – Heat – transfer in two dimensions – incompressible fluid flow.

TOTAL : 45 HRS

TEXT BOOK:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Introduction to Finite Element in Engineering, Third Edition	Chandrupatla, T.R., and Belegundu, A.D	Prentice Hall, India	2010

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	An Introduction to Finite Element Method	Reddy J N	McGraw-Hill, Intl. Student Edition, New Delhi	2009
2	The finite element method, Basic formulation and linear problems, Vol.1	Zienkiewics	McGraw-Hill, Book Co, New Delhi	2000
3	The Finite Element Method in Engineering	Rao. S.S	PergamanPress.New Delhi.	2010

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- http://www.asce.org/
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- http://icevirtuallibrary.com/
- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

17BECEE018 GEOGRAPHICAL INFORMATION SYSTEM (GIS) 3 0 0 3 100

OBJECTIVE:

1. To know about the principles of remote sensing and spectral signatures
2. To know about satellites, types of remote sensing and digital image processing
3. To study about the history and components of GIS
4. To study about data types and operations.
5. To know the applications of remote sensing and GIS for various applications on Civil Engineering.
6. To apply the concepts of DBMS in GIS.

COURSE OUTCOMES

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

1. Demonstrate the concepts of Electro Magnetic energy, spectrum and spectral signature curves.
2. Apply the concepts of satellite and sensor parameters and characteristics of different platforms.
3. Apply the concepts of DBMS in GIS.
4. Analyze raster and vector data and modeling in GIS.
5. Apply GIS in land use, disaster management, ITS and resource information system.
6. Know the types of remote sensing and digital image processing

UNIT I **9**

GIS Technique and Data Input: Development of GIS – Components of GIS – Hardware, software-MAP – Types of Maps.

UNIT II **9**

Data Analysis and Modelling: Simple Analysis – Spatial Analysis – Overlay – Vector Data Analysis – Raster Data Analysis – Data Retrieval – Query –Modelling using GIS – Digital Elevation Model – Cost and path analysis – Expert Systems – Artificial Intelligence – Integration with GIS

UNIT III **9**

Data Output and Error Analysis: Data Output – Types – Devices used – Raster and Vector Display Devices – Printers – Plotters – Photo write Devices – Sources of Errors – Types of Errors – Elimination – Accuracies

UNIT IV **9**

GIS Applications in Resource Management: Fields of Applications – Natural Resources – Agriculture – Soil – Water Resources – Wasteland Management – Social Resources – Cadastral Records – LIS

UNIT V **9**

Advanced GIS Application: AM/FM – Utility Network Management – Integration with Remote Sensing – Knowledge based techniques – Multicriteria Techniques – Introduction to Object Oriented Data base Models.

TOTAL : 45 HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Principles of GIS for Land Resources Assessment	Burrough P A	Oxford Publication, New York	2000
2	Fundamentals of Geographical Information Systems, Second Edition	Michael N Demers	John Wiley Publications.New York	2002

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing

1	Geographical Information Systems Volume I and II, Second Edition	Paul A Longley, Michael F Goodchild	John Wiley Publications,New York	2001

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- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

INTRODUCTION TO SOIL DYNAMICS AND MACHINE

17BECEE019 FOUNDATIONS 3 0 0 3 100

OBJECTIVE:

1. To explain the significance of dynamic load in machine foundation analysis
2. To explain theory of vibration for different field conditions
3. To explain the principles of machine foundation design for reciprocating and impact machines
4. To explain the concept and method of foundation isolation.
5. To understand foundation isolation and its significance in machine foundation.
6. To use vibration theory in soil dynamics and ascertain soil behaviour accordingly

COURSE OUTCOMES

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

1. Understand the influence of dynamic load in the machine foundation analysis and design
2. Use vibration theory in soil dynamics and ascertain soil behviour accordingly
3. Do machine foundation analysis and design for reciprocating and impact machines.
4. Understand foundation isolation and its significance in machine foundation.
5. The principles of machine foundation design for reciprocating and impact machines
6. Explain the concept and method of foundation isolation.

UNIT I **9**

Introduction : Vibration of elementary systems-vibratory motion-single degree freedom system-free and forced vibration with and without damping

UNIT II **9**

Waves and Wave Propagation: Wave propagation in an elastic homogeneous isotropic medium-Raleigh, shear and compression waves-waves in elastic half space

UNIT III **9**

Dynamic Properties of Soils: Elastic properties of soils-coefficient of elastic, uniform and non-uniform compression - shear-effect of vibration dissipative properties of soils-determination of dynamic properties of soil- codal provisions

UNIT IV **9**

Design Procedures: Design criteria -dynamic loads - simple design procedures for foundations under reciprocating machines - machines producing impact loads - rotary type machines

UNIT V **9**

Vibration Isolation: Vibration isolation technique-mechanical isolation-foundation isolation-isolation by location-isolation by barriers- active passive isolation tests.

TOTAL : 45 HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Soil Dynamics and Machine Foundations	Swamisaran	Galgotia Publications Pvt. Ltd.Chennai	2011

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Vibration Analysis and Foundation Dynamics	KameswaraRao	Wheeler Publishing, New Delhi	2002
2	IS code of Practice for Design and Construction of Machine Foundations, McGraw-Hill,			
3	Foundation for machines	**S**. **Prakash** and T. Fennessey	McGraw-Hill,New Delhi.	2003
4	Hand book of Machine Foundations	Srinivasulu, P &Vaidyanathan	McGraw-Hill New Delhi	2007
5	Geotechnical Earthquake Engineering	KramarS.L	Prentice Hall International series,Pearson Education (Singapore)Pvt. Ltd	2003
6	Dynamics Soil Tests and Applications	KameswaraRao	Wheeler Publishing,New Delhi,	2000

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- http://icevirtuallibrary.com/
- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

17BECEE020 INDUSTRIAL STRUCTURES 3 0 0 3 100

OBJECTIVE:

1. This course deals with some of the special aspects with respect to Civil Engineering structures in industries.
2. To Know the different classification of industrial structures.
3. To Know the functional requirement of industrial structures.
4. To design Bunkers and silos.
5. To design the RC structures like Chimneys, bunkers and silos.
6. To know the principles of roof trusses.

COURSE OUTCOMES

1. At the end of this course the student shall be able to design some of the structures used in industries.
2. Special aspects with respect to Civil Engineering structures in industries.
3. The different classification of industrial structures.
4. The functional requirement of industrial structures.
5. Design Bunkers and silos.
6. Design the RC structures like Chimneys, bunkers and silos.

UNIT I **9**

Planning: Classification of Industries and Industrial structures – General requirements for industries like cement, chemical and steel plants – Planning and layout of buildings and components.

UNIT II **9**

Functional Requirements: Lighting – Ventilation – Accounts – Fire safety – Guidelines from factories act.

UNIT III **9**

Design of Steel Structures: Industrial roofs – Crane girders – Mill buildings – Design of Bunkers and Silos

UNIT IV **9**

Design of R.C. Structures: Silos and bunkers – Chimneys – Principles of folded plates and shell roofs

UNIT V **9**

Prefabrication: Principles of prefabrication – Prestressed precast roof trusses- Functional requirements for Precast concrete units

TOTAL: 45 HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Reinforced Concrete Structural elements	Purushothaman .P.	Tata McGraw-Hill Publishing Company Ltd.New Delhi	2000
2	Design of Steel Structure	PasalaDayaratnam	Oxford and IBH PublishingCo. New York	2002

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Buildings for Industry, vols. I and II	Henn W	London Hill Books	2000
2	Handbook on Functional Requirements of Industrial buildings, SP32 – 1986, Bureau of Indian Standards, New Delhi			
3	Course Notes on Modern Developments in the Design and Construction of Industrial Structures, Structural Engineering Research Centre,1982. Madras.			

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- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

ENVIRONMENTAL IMPACT ASSESSMENT OF

17BECEE021 WATER RESOURCES DEVELOPMENT 3 0 0 3 100

OBJECTIVE:

1. To be introduced to environmental impact assessment and the current legislation covering it.
2. To understand Prediction and Assessment of Impact.
3. To learn planning for mitigation of adverse impact on environment.
4. To Analyse case studies.
5. Through case studies, learn to present and explain the components and decision-making processes involved in environmental assessment.
6. To present and explain the components and decision-making processes involved in environmental assessment through various case studies.

COURSE OUTCOMES

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

1. Review the key concepts of environmental impact assessment and the current legislation covering it
2. Understand the Prediction and Assessment of Impact on land, water, air, noise and energy, flora and fauna and Socio Economics
3. Plan options for mitigation of adverse impact on environment
4. Present and explain the components and decision-making processes involved in environmental assessment through various case studies.
5. Learn planning for mitigation of adverse impact on environment.
6. Analyse case studies.

UNIT I ENVIRONMENTAL ISSUES 9

Water resources development and environmental issues – Environment in water resources project planning – Environmental regulations and requirements – The EIA (Environmental Impact Assessment) notification.

UNIT II EIA FUNDAMENTALS 9

Environmental Impact Assessment (EIA) – Environmental Impact Statement – EIA in Project Cycle – Legal and Regulatory aspects in India according to Ministry of Environment and Forests – Types and limitations of EIA – Cross sectoral issues and terms of reference in EIA –Participation of Public and Non-Governmental Organizations in environmental decision making

UNIT III ENVIRONMENTAL IMPACTS 9

Hydrological and water quality impacts – Ecological and biological impacts – Social and cultural impacts – Soil and landscape changes – Agro economic issues – Human health impacts – Ecosystem changes.

UNIT IV METHODS OF EIA 9

EIA team formation – Development of scope, mandate and study design – Base line survey – Check lists – Ad hoc procedures – Network and matrix methods – Semi-quantitative methods – ICID checklist – Economic approaches – Environmental Impact Statement (EIS) preparation.

UNIT V ENVIRONMENTAL MANAGEMENT 9

In-stream ecological water requirements - Public participation in environmental decision making – Sustainable water resources development – Ecorestoration – Hydrology and global climate change – Human ecology – Ecosystem services – Environmental monitoring programs.

TOTAL : 45 HRS

TEXT BOOKS

Sl.No	Name of the Book	Author Name	Publisher	Year
1	Environmental Impact Assessment	Canter, L.W	McGraw Hill International Edition, New York	2008
2	Environmental Impact Assessment	Barathwal, R.R	New Age International Publishers, New Delhi	2002

REFERENCES:

Sl.No	Name of the Book	Author Name	Publisher	Year
1	Handbook of Environmental Impact Assessment	Petts, J	Blackwell Science London	1999
2	Environmental Impact Assessment – Practical solutions to recurrent problems	Lawrence, D.P	Wiley-Inter Science, New Jersey	2003
3	Hydrology and global environmental change	Arnel, N	Prentice Hall, Harlow	2002

WEB SITES:

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- www.civil.ubc.ca
- www.aboutcivil.com

17BECEE022 CONSTRUCTION RESOURCE PLANNING AND MANAGEMENT 3 0 0 3 100

OBJECTIVE:

1. To explain how do optimize construction period by suing management techniques
2. To explain the role of construction planning in civil construction projects
3. To emphasis project monitoring during execution time and quality control
4. To understand different construction methods and selection of methods based on the project requirements
5. To explain role of construction equipment's in civil construction projects and selection of equipment with project specific.
6. To select proper and effective construction methods and equipment's

COURSE OUTCOMES

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

1. Understand the importance of management techniques in civil construction
2. Do proper construction planning for effective project execution
3. Prepare tender & contract documents and project quality control as per national and international standards
4. Select proper and effective construction methods and equipment's
5. Explain the role of construction planning in civil construction projects
6. Emphasis project monitoring during execution time and quality control

UNIT I **9**

Construction Planning: Basic concepts in the development of construction plans-choice of Technology and Construction method-Defining Work Tasks- Definition- Precedence relationships among activities-Estimating Activity Durations-Estimating Resource Requirements for work activities-coding systems

UNIT II **9**

Scheduling Procedures And Techniques: Relevance of construction schedules-Bar charts - The critical path method-Calculations for critical path scheduling-Activity float and schedules-Presenting project schedules-Critical path scheduling for Activity-on-node and with leads, Lags and Windows-Calculations for scheduling with leads, lags and windows-Resource oriented scheduling-Scheduling with resource constraints and precedences -Use of Advanced Scheduling Techniques-Scheduling with uncertain durations-Crashing and time/cost trade offs -Improving the Scheduling process – Introduction to application software

UNIT III **9**

Cost Control Monitoring And Accounting: The cost control problem-The project Budget-Forecasting for Activity cost control - financial accounting systems and cost accounts-Control of project cash flows-Schedule control-Schedule and Budget updates-Relating cost and schedule information

UNIT IV **9**

Quality Control And Safety During Construction: Quality and safety Concerns in Construction-Organizing for Quality and Safety-Work and Material Specifications-Total Quality control-Quality

control by statistical methods -Statistical Quality control with Sampling by Attributes-Statistical Quality control by Sampling and Variables-Safety.

UNIT V **9**

Organization And Use Of Project Information: Types of project information-Accuracy and Use of Information-Computerized organization and use of Information -Organizing information in databases-relational model of Data bases-Other conceptual Models of Databases-Centralized database Management systems-Databases and application programs-Information transfer and Flow.

TOTAL: 45HRS

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Construction Project Management Planning, Scheduling and Control	Chitkara, K.K	Tata McGraw-Hill Publishing Co., New Delhi	2002
2	Project Management for Construction–Fundamentals Concepts for Owners"	Chris Hendrickson and Tung Au	Prentice Hall, Pittsburgh	2000

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Scheduling Construction projects	Willis. E.M.,	John Wiley and Sons, New York	2000
2	Financial and cost concepts for construction Management	Halpin, D.W	John Wiley and Sons New York	2002

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- http://icevirtuallibrary.com/
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17BECEE023 TRAFFIC ENGINEERING AND MANAGEMENT 3 0 0 3 100

OBJECTIVE:

1. To learn the fundamentals of traffic engineering
2. To learn the methods of intersection design
3. To learn the skills of traffic control
4. To be introduced to the different theories of traffic flow
5. To be aware of the importance of traffic safety
6. To be aware of traffic flow theory

COURSE OUTCOMES

Upon completing of this course, the students should be able to:

1. Carry out traffic studies
2. Design intersections
3. Implement traffic system management
4. Be aware of traffic flow theory
5. Enhance safety in all design aspects
6. The skills of traffic control

UNIT I **9**

Introduction: Significance and scope, Characteristics of Vehicles and Road Users, Skid Resistance and Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics

UNIT II **9**

Traffic Surveys and Analysis: Surveys and Analysis - Volume,Journey time ,Capacity, Speed and Delays, Origin and Destination, Parking Survey, Pedestrian Studies, Accident analysis and Safety Level of Services- applications and significance.

UNIT III **9**

Traffic Control: Traffic signs, Road markings, Design of Traffic signals and Signal co-ordination (Problems), Traffic control aids and Street furniture, Street Lighting, Computer applications in Signal design

UNIT IV **9**

Geometric Design Of Intersections : Conflicts at Intersections, Classification of Intersections at Grade, - Chanalised and Unchanallised Intersection - Grade Separators (Concepts only), Principles of Intersection Design, Elements of Intersection Design, Canalization and Rotary design (Problems), Grade Separators

UNIT V **9**

Traffic Management: Area traffic Management system- Traffic System Management (TSM) and Travel Demand Management (TDM), Traffic Forecasting techniques, Restrictions on turning movements, One-way Streets, Traffic Segregation, Traffic Calming, Tidal flow operations, Exclusive Bus Lanes - Introduction to Intelligence Transport System (ITS)-enforcement and education.

TOTAL : 45HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Highway Engineering,	Khanna K and Justo C E G	Khanna Publishers, Roorkee	2001
2	Traffic Engineering and Transport Planning	Kadiyali L	Khanna Technical Publications, Delhi	2000

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Indian Roads Congress (IRC) specifications: Guidelines and special publications on Traffic Planning and Management			
2	Guidelines of Ministry of Road Transport and Highways, Government of India.			
3	A Course in Traffic Planning and Design	SubhashC.Saxena	DhanpatRai Publications, New Delhi	2002

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- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

17BECEE024 REMOTE SENSING TECHNIQUES AND APPLICATIONS 3 0 0 3 100

OBJECTIVE:

1. To gain a sound fundamental understanding of the GIS and remote sensing technologies
2. To understand the basic principles underlying the GIS/model-based management of water resources and environment.
3. To become familiar with the GIS-based analytical and problem-solving techniques for sustainable planning and management of water resources and environmental problems.
4. Different types of remotely sensed images and data available for water resource applications.
5. To apply the GIS-based analytical and problem-solving techniques for sustainable planning and management of water resources and environmental problems.
6. To develop a project report and can develop Water Resource Information Systems (WRIS) for regional and basin scale.

COURSE OUTCOMES

By the end of this course the students will be able to

1. Develop fundamental understanding of the GIS and remote sensing technologies
2. Understand the basic principles underlying the GIS based management of water resources and environment.
3. Apply the GIS-based analytical and problem-solving techniques for sustainable planning and management of water resources and environmental problems.
4. Understand the types of remotely sensed images and data available for water resource applications.
5. Develop a project report and can develop Water Resource Information Systems (WRIS) for regional and basin scale.
6. Understand the basic principles underlying the GIS/model-based management of water resources and environment.

UNIT I **9**

Introduction: Definition – Physics of remote sensing – electromagnetic radiation (EMR) – remote sensing windows – interaction of EMR with atmosphere, earth surface, soil, water and vegetation – platform and sensor – image interpretation.

UNIT II **9**

Land Use Studies: Definition of land use – land use / land cover classification – schemes and levels of classification systems with RS data – land use mapping – change detection – urban land use planning, site suitability analysis, transportation planning.

UNIT III **9**

Water Resources :Area assessment of surface water bodies – Capacity survey of water bodies – mapping of snow-covered areas – flood risk zone mapping – identification of groundwater potential zones, recharge areas – droughts-definition-drought assessment and management.

UNIT IV **9**

Agriculture, Soil And Forestry: Crop inventory mapping – production estimation – command area monitoring – soil mapping – crop stress detection - estimation of soil erosion – forest types and density mapping – forest fire risk zone mapping.

UNIT V **9**

Earth Science: Lithology – lithological mapping – structural mapping – Geomorphology – nature and type of landforms – identification – use of remote sensing data for landslides – targeting mineral resources – Engineering geology and Environmental geology.

TOTAL : 45 HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Remote sensing methods and application	Michael Hord, R	John Wiley and Sons, New York	2004
2	Remote sensing principles and interpretation	Sabins, F.F.Jr	W.H.Freeman &Co.New York	2007

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Remote Sensing and Image interpretation	Lillesand, T.M and KicterR.W	John Willey and sons, inc. New York	2002
2	Application of Remote sensing in Agriculture	Steven, M.D, and Cllark, J.A	Butterworths, London	1990
3	Manual for Forest mapping and Damage detection using satellite data- Space Applications Centre,1990, Report No.IRS-UP/SAC/FMDD/TN/16/90,1990			
4	Manual of Remote Sensing Vol. II. American Society of Photogrammetry			

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- http://www.cif.org/

17BECEE025 INDUSTRIAL WASTE MANAGEMENT 3 0 0 3 100

OBJECTIVE:

1. To impart knowledge on sources and characteristics of various industrial wastes and strategies for its prevention and control.
2. To know the Industrial waste generation patterns, as well as management and disposal techniques
3. To gain knowledge of Central and state pollution control board guidelines on industrial waste management
4. To know the schemes, incentives, policies on industrial waste management
5. To overview of product design for waste minimization
6. Cost benefit analysis of different waste management techniques

COURSE OUTCOMES

The students completing the course will have

1. An insight into the pollution from major industries including the sources and characteristics of pollutants
2. Ability to plan minimization of industrial wastes
3. Ability to design facilities for the processing and reclamation of industrial waste water.
4. Industrial waste generation patterns, as well as management and disposal techniques
5. Knowledge of Central and state pollution control board guidelines on industrial waste management.
6. To know the schemes, incentives, policies on industrial waste management

UNIT I **9**

Introduction: Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes

UNIT II **9**

Cleaner Production: Waste management Approach – Waste Audit – Volume and strength reduction – Material and process modifications – Recycle, reuse and byproduct recovery – Applications.

UNIT III **9**

Pollution from Major Industries: Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Pharmaceuticals, Electroplating industries, Dairy, Sugar, Paper, distilleries, Steel plants, Refineries, fertilizer, thermal power plants – Wastewater reclamation concepts

UNIT IV **9**

Treatment Technologies: Equalisation – Neutralisation – Removal of suspended and dissolved organic solids - Chemical oxidation – Adsorption - Removal of dissolved inorganics – Combined treatment of industrial and municipal wastes – Residue management – Dewatering - Disposal

UNIT V **9**

Hazardous Waste Management : Hazardous wastes - Physico chemical treatment – solidification – incineration – Secured land fills

TOTAL : 45 HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Wastewater Treatment	M.N.Rao&A.K.Dutta	Oxford - IBH Publication. New York	2002
2	Industrial Water Pollution Control	W.W. Eckenfelder Jr	McGraw-Hill Book Company, New Delhi	2000

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Industrial Wastewater Systems Hand book	Stephenson R L and Blackburn J B., Jr	Lewis Publisher, New York	2000
2	Industrial Pollution Prevention Hand Book	H.M.Freeman	McGraw-Hill Inc**.,** New Delhi	2002

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- http://www.engineering-software.com/ce/

17BECEE026 TALL BUILDINGS 3 0 0 3 100

OBJECTIVE:

1. The design aspects and analysis methodologies of tall buildings will be introduced.
2. . The stability analysis of tall buildings is another important objective of this course.
3. To learn the general planning consideration of various load factors, vertical structure plane, High rise building structure
4. To have the behavior, structural analysis and design and also other high-rise building structure.
5. To understand the behaviour of tall buildings subjected to lateral building.
6. To know the rudimentary principles of designing tall buildings as per the existing codes.

COURSE OUTCOMES

1. At the end of this course students should have learnt the general planning consideration of various load factors, vertical structure plane, High rise building structure
2. Will have the behavior, structural analysis and design and also other high-rise building structure.
3. Understanding on the behaviour of tall buildings subjected to lateral building.
4. Knowledge about the rudimentary principles of designing tall buildings as per the existing codes.
5. Design aspects and analysis methodologies of tall buildings will be introduced.
6. Stability analysis of tall buildings is another important objective of this course

UNIT I **9**

Introduction: The Tall Building in the Urban Context - The Tall Building and its Support Structure - Development of High Rise Building Structures - General Planning Considerations. Dead Loads - Live Loads-Construction Loads -Snow, Rain, and Ice Loads - Wind Loads-Seismic Loading –Water and Earth Pressure Loads - Loads - Loads Due to Restrained Volume Changes of Material - Impact and Dynamic Loads - Blast Loads -Combination of Loads.

UNIT II **9**

The Vertical Structure Plane: Dispersion of Vertical Forces- Dispersion of Lateral Forces - Optimum Ground Level Space - Shear Wall Arrangement - Behaviour of Shear Walls under Lateral Loading. The Floor Structure or Horizontal Building Plane Floor Framing Systems-Horizontal Bracing- Composite Floor Systems The High - Rise Building as related to assemblage Kits Skeleton Frame Systems - Load Bearing Wall Panel Systems - Panel – Frame Systems - Multistory Box Systems.

UNIT III **9**

Common High-Rise Building Structures and Their Behavior Under Load: The Bearing Wall Structure- The Shear Core Structure - Rigid Frame Systems- The Wall - Beam Structure: Interspatial and Staggered Truss Systems - Frame - Shear Wall Building Systems - Flat Slab Building Structures - Shear Truss - Frame Interaction System with Rigid - Belt Trusses - Tubular Systems-Composite Buildings - Comparison of High - Rise Structural Systems Other Design Approaches Controlling Building Drift Efficient Building Forms - The Counteracting Force or Dynamic Response.

UNIT IV **9**

Approximate Structural Analysis and Design of Buildings: Approximate Analysis of Bearing Wall Buildings The Cross Wall Structure - The Long Wall Structure The Rigid Frame Structure

Approximate Analysis for Vertical Loading - Approximate Analysis for Lateral Loading - Approximate Design of Rigid Frame Buildings-Lateral Deformation of Rigid Frame Buildings The Rigid Frame - Shear Wall Structure - The Vierendeel Structure - The Hollow Tube Structure.

UNIT V **9**

Other High-Rise Building Structure: Deep - Beam Systems -High-Rise Suspension Systems - Pneumatic High -Rise Buildings - Space Frame Applied to High - Rise Buildings - Capsule Architecture.

TOTAL : 45 HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	High - rise building Structures	Wolfgang Schueller	John Wiley and Sons, New York	2001
2	Tall Building Structures , Analysis and Design	Bryan Stafford Smith and Alex Coull	John Wiley and Sons, Inc,New York	2005

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Tall Buildings	Coull, A. and Smith, Stafford, B	Pergamon Press, London,	2006
2	Structural Concepts and Systems for Architects and Engineers	LinT.Y. and Burry D.Stotes	John Wiley, New York	2008
3	Advances in Tall Buildings	Lynn S.Beedle	CBS Publishers and Distributors, Delhi	2010
4	Structural Analysis and Design of Tall Buildings	Taranath.B.S.,	Mc Graw Hill,New Delhi.	2010

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17BECEE027 DESIGN OF BRIDGE STRUCTURES 3 0 0 3 100

OBJECTIVE:

1. To develop an understanding of basic concepts in bridge engineering like components, classification, importance, investigation of bridges and loading conditions.
2. To study the design of Culvert, Foot Bridge, Slab Bridge, T-beam Bridge and Box Culvert using IRC.
3. To study the design of various sub-structures like piers, abutments, foundations
4. To study the importance of the bearing and joints in construction of the bridge.
5. To select the suitable site and type of the bridge.
6. To prepare a detailed project report for the construction of bridge giving hydraulic particulars of the river and soil details

COURSE OUTCOMES

Upon completion of this course, the student will be able to:

1. Prepare a detailed project report for the construction of bridge giving hydraulic particulars of the river and soil details
2. Select the suitable site and type of the bridge.
3. Design various types of bridges like Culvert, Slab Bridge and T-beam Bridge using provisions of IRC.
4. Design pier, abutment, foundations, bearing and detailing of joints.
5. Design of Culvert, Foot Bridge, Slab Bridge, T-beam Bridge and Box Culvert using IRC.
6. understanding of basic concepts in bridge engineering like components, classification, importance, investigation of bridges and loading conditions.

UNIT I **9**

Introduction: History of Bridges - Components of a Bridge and its definitions- Classification of Road Bridges - Selection of Site and Initial Decision Process - Survey and Alignment; Geotechnical Investigations and Interpretations. River Bridge: Selection of Bridge site and planning - Collection of Bridge design data - Hydrological calculation Road Bridges - IRC codes - Standard Loading for Bridge Design - Influence lines for statically determinate structures - I.L. for statically indeterminate structure

UNIT II **9**

Steel Bridges : Design of through type steel highway bridges for IRC loading - Design of stringers, cross girders and main girders- Design of deck type plate girder railway bridges for railway loading- Design of main girders

UNIT III **9**

Reinforced Concrete Slab Bridges : Design of solid slab bridges for IRC loading - Pigeaud's curves- Design of panel and cantilever for IRC loading

UNIT IV **9**

Reinforced Concrete Girder Bridges : Courbon's theory – Design of Tee beam Girder bridges - Deck slab -Main girder-Cross girder - Design of PSC bridge.

UNIT V **9**

Substructure, bearings and deck joints, parapets and railings

Substructure - Pier; Abutment - Wing walls- Importance of Soil-Structure Interaction - Types of foundations - Open foundation- Pile foundation- Well foundation- Simply supported bridge-

Continuous Bridge - Bearings and Deck Joints - Different types of bridge bearings and expansion joints - Parapets and Railings for Highway Bridges

TOTAL : 45 HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Essentials of Bridge Engineering	Johnson Victor D	Oxford and IBH Publishing Co. New York	2010
2	Design of Bridges	Krishna raju N	Oxford and IBH Publishing Co. New York	2010

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Bridge Engineering	PhatakD.R	SatyaPrakashan, New Delhi	2010
2	Bridge Engineering	Ponnuswamy S	Tata McGraw-Hill, New Delhi	2011

WEBSITES:

- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/
- http://icevirtuallibrary.com/
- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

17BECEE028 SEISMIC DESIGN OF REINFORCED CONCRETE STRUCTURES
3 1 0 3 100

OBJECTIVE:

1. To introduce the basics of Earthquake Engineering
2. To introduce the engineering seismology, building geometrics & characteristics, structural irregularities,
3. To introduce tips on earthquake engineering - do's and don'ts
4. To introduce cyclic loading behaviour of RC, steel and pre-stressed concrete elements
5. To discuss code provisions and their application on different types of structures
6. To apply codal provisions on different types of structures

COURSE OUTCOMES

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

1. Apply the basics of Earthquake Engineering
2. Demonstrate the dynamics of structural system under earthquake load
3. Analyze the influence of the structural / geometrical design in building characteristics
4. Demonstrate the cyclic loading behaviour of RC steel and pre-stressed concrete elements
5. Apply codal provisions on different types of structures.
6. Cyclic loading behaviour of RC, steel and pre-stressed concrete elements

UNIT I **9**

Single Degree Of Freedom Systems: Formulation of equation of motion, Free and forced vibrations, Damping, Types of Damping – Damped and undamped vibrations, Response to dynamic loading. Introduction of Free and forced vibration of undamped and damped MDOF systems

UNIT II **9**

Engineering Seismology: Elements of Engineering Seismology, Characteristics of Earthquake Engineering, Earthquake History, Indian Seismicity. Performance of structures under past earthquakes, Lessons learnt from past earthquakes.

UNIT III **9**

Seismic Analysis: Seismic Design Concepts- Calculation of base shear as per IS1893- Lateral Load analysis of building frames by Portal method and Cantilever method.

UNIT IV **9**

Earthquake Resistant Design: Concept of Earthquake Resistant Design, Provisions of Seismic Code IS 1893 (Part I), Response Spectrum, Design Spectrum, Design of Buildings.

UNIT V **9**

Ductile Detailing: Ductility- Assessment of Ductility- Member/ Element ductility, Structural Ductility- Factors affecting ductility-Ductile Detailing, Provisions of IS 13920.for beams, columns and footings- Special Confining Requirements.

TOTAL: 45 HRS

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Earthquake Resistant Design of Structures,	Agarwal and Shrikhande	Prentice Hall of India,	2007

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Structural Dynamics – Theory and Computations, Third Edition	Mario Paz	CBS publishers,New York	2007
2	Design of Earthquake Resistant Buildings	AgarwalPankaj and Shrikhande Manish	Mc- Graw Hill Book Company, New York	2006
3	Dynamics of Structures	Humar J	Prentice Hall, India	2012
4	Dynamics of structures – Theory and applications to Earthquake Engineering	Anil K Chopra	Prentice Hall Inc, India	2001
5	Earthquake Tips	C V R Moorthy	NICEE,IIT Kanpur	2004
6	Dynamics of Structures, Second Edition	Clough R.W, and Penzien J,	McGraw – Hill International Edition,New Delhi	2003

WEBSITES:

- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/
- http://www.cif.org/
- http://icevirtuallibrary.com/
- http://www.ice.org.uk/
- http://www.engineering-software.com/ce/

17BECEE029 HIGHWAY ENGINEERING 3 0 0 3 100

OBJECTIVES:

1. To understand the importance of transportation and characteristics of road transport
2. To know about the history of highway development, surveys and classification of roads
3. To study about the geometric design of highways
4. To study about traffic characteristics and design of intersections
5. To know about the pavement materials and design
6. To implement traffic studies, traffic regulations and control, and intersection design.

COURSE OUTCOMES

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

1. Carry out surveys involved in planning and highway alignment.
2. Design cross section elements, sight distance, horizontal and vertical alignment.
3. Implement traffic studies, traffic regulations and control, and intersection design.
4. Determine the characteristics of pavement materials.
5. Design flexible and rigid pavements as per IRC.
6. Understand the importance of transportation and characteristics of road transport

UNIT I **9**

HIGHWAY PLANNING AND ALIGNMENT: Macadam's method of Road Construction, Highway Development in India – Jayakar Committee RecommendationsTwenty-year Road Development Plans, Concepts of On-going Highway Development Programmed at National Level-Indian Roads Congress, Highway Research Board, National Highway Authority of India, Ministry of Road Transport and Highways (MORTH) and Central Road Research Institute. Requirements of Ideal Alignment, Factors Controlling Highway Alignment –Engineering Surveys for Alignment – Classification and Cross Section of Urban and Rural Roads (IRC), Highway Cross Sectional Elements – Right of Way, Carriage Way, Camber, Kerbs, Shoulders and Footpaths [IRC Standards],

UNIT II **9**

GEOMETRIC DESIGN OF HIGHWAYS: Design of Horizontal Alignments – Super elevation, Widening of Pavements on Horizontal Curves and Transition Curves [Derivation of Formulae and Problems]-Design of Vertical Alignments – Rolling, Limiting, Exceptional and Minimum Gradients, Summit and Valley Curves-Sight Distances – Factors affecting Sight Distances, PIEV theory, Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD), Sight Distance at Intersections, Intermediate Sight Distance and Illumination Sight Distance [Derivations and Problems in SSD and OSD]-Geometric Design of Hill Roads [IRC Standards Only]

UNIT III **9**

DESIGN OF RIGID AND FLEXIBLE PAVEMENTS: Rigid and Flexible Pavements-Components and their Functions-Design Principles of Flexible and Rigid Pavements, Factors affecting the Design of Pavements – ESWL, Climate, Sub-grade Soil and Traffic-Design Practice for

Flexible Pavements [CBR method, IRC Method and Recommendations- Problems]-Design Practice for Rigid Pavements – [IRC Recommendations-Problems] – Joints

UNIT IV **9**

HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE: Desirable Properties and Testing of Highway Materials: Soil – California Bearing Ratio Test, Field Density Test- Aggregate – Crushing, Abrasion, Impact Tests, Water absorption, Flakiness and Elongation indices and Stone polishing value test-Bitumen – Penetration, Ductility, Viscosity, Binder content and Softening point Tests.-Construction Practice – Water Bound Macadam Road, Bituminous Road and Cement Concrete Road [as per IRC and MORTH specifications]-Highway Drainage [IRC Recommendations]

UNIT V **9**

HIGHWAY MAINTENANCE: Types of defects in Flexible pavements – Surface defects, Cracks, Deformation, Disintegration – Symptoms, Causes and Treatments. Types of Pavement, Failures in Rigid Pavements – Scaling, Shrinkage, Warping, Structural Cracks Spalling of Joints and Mud Pumping – and Special Repairs. Pavement Evaluation – Pavement Surface Conditions and Structural Evaluation, Evaluation of pavement Failure and strengthening – Overlay design by Benkelman Beam Method [Procedure only], Principles of Highway Financing

TOTAL: 45 HRS

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Highway Engineering	Khanna K and Justo C E G	Khanna Publishers, Roorkee	2009

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Principles and Practice of Highway Engineering	Kadiyali L R	Khanna Technical Publications, Delhi.	2004

IRC Standards (IRC 37 – 2001 & IRC 58 -1998)
Bureau of Indian Standards (BIS) Publications on Highway Materials
Specifications for Road and Bridges, MORTH (India)

WEBSITES

- http://www.icivilengineer.com
- http://www.engineeringcivil.com/
- http://www.aboutcivil.com/
- http://www.engineersdaily.com
- http://www.asce.org/

17BECEE030 HOUSING, PLAN AND MANAGEMENT 3 0 0 3 100

OBJECTIVE:

1. To examine the role and tasks of basic housing policies and building bye laws
2. Understand the process of integrated service delivery in the context of economic, social, environmental and institutional factors
3. Analyze the Innovative construction methods and Materials
4. Analyze city management strategies and strengthen the urban governance through a problem solving approach
5. To know the Importance of basic housing policies and building bye laws
6. To use Housing Programmes and Schemes

COURSE OUTCOME

The students will be able to

1. Know the Importance of basic housing policies and building bye laws
2. Use Housing Programmes and Schemes
3. Plan and Design of Housing projects
4. Examine Innovative construction methods and Materials
5. Know Housing finance and loan approval procedures
6. Understand Construction as well as managing techniques

UNIT I INTRODUCTION TO HOUSING 9

Definition of Basic Terms – House, Home, Household, Apartments, Multi storeyed Buildings, Special Buildings, Objectives and Strategies of National Housing Policies, Principle of Sustainable Housing, Housing Laws at State level, Bye-laws at Urban and Rural Local Bodies – levels - Development Control Regulations, Institutions for Housing at National, State and Local levels

UNIT II HOUSING PROGRAMMES 9

Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighbourhoods, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programmes, Role of Public, Private and Non-Government Organisations.

UNIT III PLANNING AND DESIGN OF HOUSING PROJECTS 9

Formulation of Housing Projects – Site Analysis, Layout Design, Design of Housing Units (Design Problems)

UNIT IV CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS 9

New Constructions Techniques – Cost Effective Modern Construction Materials, Building Centers – Concept, Functions and Performance Evaluation

UNIT V HOUSING FINANCE AND PROJECT APPRAISAL 9

Appraisal of Housing Projects – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy, Pricing o f Housing Units, Rents, Recovery Pattern (Problems).

TOTAL: 45 HRS

TEXT BOOKS

1. Meera Mehta and Dinesh Mehta, Metropolitan Housing Markets, Sage Publications Pvt. Ltd., New Delhi, 2002.
2. Francis Cherunilam and Odeyar D Heggade, Housing in India, Himalaya Publishing House, Bombay, 2001.

REFERENCES

1. Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 2002.
2. UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS (Habitat), Nairobi, 2000.

17BECEE031 ADVANCED CONSTRUCTION TECHNOLOGY 3 0 0 3 100

OBJECTIVE:

1. To learnt the modern construction methods, methods for special structures, modern equipment's used for excavation, conveyance etc. and principles and practices of temporary structures.
2. To gain knowledge of Pile foundations
3. To study about Modified Concrete
4. To gain knowledge of Pre fabrication systems and methods
5. To know the techniques of Earthquake proof construction
6. To take precautionary measures to prevent cracks in buildings

OUTCOMES:

1. The modern construction methods, methods for special structures, modern equipment's used for excavation, conveyance etc. and principles and practices of temporary structures.
2. Knowledge of Pile foundations
3. Study about Modified Concrete
4. Gain knowledge of Pre fabrication systems and methods
5. The techniques of Earthquake proof construction
6. Take precautionary measures to prevent cracks in buildings

UNIT - I MODERN CONSTRUCTION METHODS 9

Open Excavation, Shafts and Tunnels- Preparation of foundation, Cofferdams, Caisson, Piled Foundation, Prestressed Concrete Construction, Pre-cast Concrete Construction.

UNIT - II CONSTRUCTION METHODS FOR SPECIAL STRUCTURES 9

Construction Methods For Bridges, Construction Methods for Roads, Construction Methods For Special Structures for Railways, Construction Methods for Dams, Construction Methods for Harbour, Construction Methods for River Works Pipelines

UNIT - III MODERN CONSTRUCTION EQUIPEMENTS -I 9

Construction Equipment used for Earth Moving, Excavating, Drilling, Blasting,Tunneling and hoisting

UNIT - IV MODERN CONSTRUCTION EQUIPEMENTS -II 9

Construction Equipment used for Conveying, Hoisting, Dredging, Dewatering Systems, Paving and concreting Plant

UNIT - V PRINCIPLES AND PRACTICES OF TEMPORARY STRUCTURES 9

Principles and Practices of Temporary structures, Shoring, and Strutting,Underpinning, Principles and Design of Formwork, Scaffolding, Operation and maintenance of construction equipments

TOTAL : 45 HRS

TEXT BOOKS

1.Peurifoyu , R. L., , Ledbette, W.B., Construction Planning , Equipment and Methods, Mc Graw Hill Co., 2000.

2. Antill J.M., PWD, Civil Engineering Construction, Mc Graw Hill Book Co., 2005

REFERENCE

1.Varma, M Construction Equipment and its Planning & Applications, Metropoltian Book Co., 2000

2.Nunnaly, S.W., Construction Methods and Management , Prentice – Hall, 2000

3.Ataev, S.S., Construction Technology, MIR , Pub. 2000

17BECEE032 DESIGN OF SHELL AND SPATIAL STRUCTURES 3 0 0 3 100

OBJECTIVE:

1. To impart knowledge on analysis of different types of plates under different boundary conditions
2. To impart knowledge on analysis of different types of shells under different boundary conditions
3. To impart knowledge on two design philosophy of RCC folded plates and shell roof structures.
4. To study the behaviour and design of shells, folded plates, space frames and application of FORMIAN software.
5. To analyze and design various types of shells, folded plates and space frames manually
6. To analyze and design various types of shells, folded plates and space frames using computer Aided design and software packages.

COURSE OUTCOMES:

1. Impart knowledge on analysis of different types of plates under different boundary conditions
2. Analysis of different types of shells under different boundary conditions
3. Impart knowledge on two design philosophy of RCC folded plates and shell roof structures.
4. The behaviour and design of shells, folded plates, space frames and application of FORMIAN software.
5. Analyze and design various types of shells, folded plates and space frames manually
6. Analyze and design various types of shells, folded plates and space frames using computer Aided design and software packages.

UNIT - I MEMBRANE THEORY OF SHELLS 9

Classification of shells - Types of shells - Structural action - Membrane theory – Shells of revolution and shells of translation - Examples - Limitations of membrane theory.

UNIT - II DESIGN OF FOLDED PLATES 9

Folded Plate structures - structural behaviour - Types - Design by ACI - ASCE Task Committee method.

UNIT - III SPACE FRAME - DESIGN PHILOSOPHY 9

Space frames - configuration - types of nodes - general principles of design Philosophy – Behaviour

UNIT - IV ANALYSIS OF SPACE FRAMES 9

Analysis of space frames - Formex Algebra, FORMIAN - Detailed design of Space Frames

UNIT - V OPTIMIZATION **9**

Optimization by structural theorems - Maxwell, Mirchell and Heyman's Theorems for trusses and frames – Fully stressed design with deflection constraints – Genetic Algorithm.

TOTAL: 45 HOURS

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
Stresses in shells	Wilhelm Flügge	Springer - Verlag	2001
Theory of Plates and Shells	Timoshenko, S	McGraw Hill	2010

REFERENCE BOOKS

Name of the Book	Author Name	Publisher	Year
Design and Construction of Concrete Shells Roofs	Ramasamy, G.S	CBS Publishers	2005
Principles of Space Structures	Dr.N.Subramanian	Wheeler Publishing Co.	2008
Optimum Structural Design	Uri Krish	McGraw Hill Book Co	2003

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

17BECEE033 GEOINFORMATICS IN CIVIL ENGINEERING 3 0 0 3 100

OBJECTIVE:

1. For students and professionals in Environmental Sciences, this course explores an integrated GIS and remote sensing approach to solve real-world environmental problems.
2. To develop understanding about Photogrammetry, remote sensing system, Global Navigation Satellite System (GNSS) and GIS.
3. To enable students to make measurements using photogrammetric technique, to carryout analysis of remotely sensed data and extract information from it.
4. To enable students conversant with data collection using GNSS systems and Differential GPS
5. To enable students prepare thematic maps and carryout analysis using GIS technique.
6. To enable students learn different applications of Photogrammetry, remote sensing system, Global Navigation Satellite System (GNSS) and GIS

OUTCOMES:

After learning the course the students should be able to:

1. Ability to develop Orthographic and Contour maps using aerial photographs and Remote sensing Image.
2. Ability to develop maps using Total Station, GIS, GPS and Scanners
3. Ability to create GIS application referencing Spatial features with Attribute data.
4. Develop understanding about Photogrammetry, remote sensing system, Global Navigation Satellite System (GNSS) and GIS.
5. Conversant with data collection using GNSS systems and Differential GPS.
6. Learn different applications of Photogrammetry, remote sensing system, Global Navigation Satellite System (GNSS) and GIS

UNIT-1 INTRODUCTION 9

Remote sensing systems, multi concept of remote sensing, Remote sensing in India Photogrammetry : terrestrial, aerial, satellite, terminology, scale, flight planning, stereo photogrammetry, relief displacement, ground co ordinates, field applications, uses, comparison of aerial photo and satellite image, digital photogrammetry.

UNIT-2 ELECTROMAGNETIC RADIATION: 9

Introduction, energy interaction in the atmosphere, earth surface feature, resolution, pixel

SENSORS AND PLATFORMS:

classification, land observation satellites, high resolution sensors, weather satellites and sensors, marine observation satellites. Satellite data products: introduction, data reception, transmission, and processing, remote sensing data products, digital data products.

UNIT-3 IMAGE INTERPRETATION: 9

Procedure, elements, strategies, keys, equipment's.

DIGITALIMAGEPROCESSING: overview of digital analysis steps, image enhancement, spatial filtering, image transformation, classification and analysis.

UNIT-4 GIS 9

GIS: Introduction, component of GIS, input data for GIS, types of out data products **GIS Data:** Data representation, data sources, data acquisition, verifications, geo referencing of GIS data, spatial data structures, modeling surfaces, networks, GIS data base management systems. Spatial data analysis: terminology, reclassification, data integration, spatial interpolation, surface analysis, network analysis, digital terrain visualization. Global Positioning System

UNIT-5 APPLICATION OF GEOINFORMATICS IN CIVIL ENGINEERING 9

Land use and land cover mapping, Transportation studies, crop inventory studies, ground water mapping, urban growth studies, flood plain mapping, waste land mapping, Waste disposal facility in urban areas and disaster management

TOTAL: 45 HRS

Text Books

Name of the Book	Author Name	Publisher	Year
Principles of Geographical Information Systems	P.A. Burrough and R.A. McDonnell	Oxford University Press	2nd edition 2011
Remote Sensing and Image Interpretation	T.M. Lillesand, R.W. Kiefer and J.W. Chipman	John Wiley and Sons, India	5th edition 2003

Reference Books

Name of the Book	Author Name	Publisher	Year
Remote Sensing and GIS	B. Bhatia	Oxford University Press, New Delhi	2008
Introductory Digital Image Processing	.R. Jensen - Prentice	J -Hall, New Jersey	2005
Remote Sensing of Environment: An Earth Perspective	J.R. Jensen	Pearson Education, Delhi	2004

WEB ITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

17BECEE034 WATER SUPPLY DISTRIBUTION AND BURIED PIPELINES 3 0 0 3 100

OBJECTIVE:

1. To understand the water supply systems and the principles behind it.
2. To know the basis for reliability assessment and designing service reservoirs using various soft wares.
3. To select the most appropriate technique for the treatment of water, wastewater solid waste and contaminatedair.
4. To plan strategies to control, reduce and monitorpollution.
5. To analyze the impact of humans on environment and environment onhumans
6. To gain the software knowledge.

OUTCOMES:

1. The water supply systems and the principles behind it.
2. The basis for reliability assessment and designing service reservoirs using various soft wares.
3. Select the most appropriate technique for the treatment of water, wastewater solid waste and contaminatedair.
4. Plan strategies to control, reduce and monitorpollution.
5. Analyze the impact of humans on environment and environment onhumans
6. Gain the software knowledge.

UNIT I WATER SUPPLY SYSTEMS 9

Water requirement – sources of water – water demand – reservoir storage – nodal hydraulic gradient level values - water supply consideration, Types of water supply systems- piping system- distribution network- labeling- network components – Network models – design – optimization in practice

UNIT II HYDRAULIC PRINCIPLES AND NETWORK PARAMETERS 9

Energy and hydraulic gradient lines – head loss in links – equivalent pipes – series – parallel pipes – path head loss and loop head loss – analysis of water distribution network- static node, dynamic node – network performance – flow analysis - Layout – in situ lining - pipes material – appurtenances – minimization of water losses – leak detection.

UNIT III STORM WATER DISTRIBUTION AND BURIED PIPES 9

Planning – runoff estimation – rainfall data analysis – storm water drain design Introduction to Buried pipes – external loads – gravity flow design, pressurized flow- rigid and flexible pipes – installation – trenchless technology

UNIT IV RELIABILITY ASSESSMENT AND DESIGN 9

Uncertainty and reliability – affecting events- assessment – reliability parameters- configurations. Design methodology - strengthening and expansion

UNIT V SOFTWARE APPLICATIONS 9

Use of software in water transmission, water distribution and sewer design – LOOP 4.0, SEWER, EPANET, BRANCH, SEWERCAD, WATERCAD, STROMNET

TOTAL: 45 HRS

TEXT BOOK

Name of the Book	Author Name	Publisher	Year
Optimal design of water distribution networks	Bhave P. R	Narosa publishing House, New Delhi	2003

REFERENCES:

Name of the Book	Author Name	Publisher	Year
Practical handbook on Public Health Engineering	Bajwa. G. S	Deep publishers, Shimla	2003
Ministry of Urban Development	CPHEEO	GOI, New Delhi	2013
Practical hydraulics Hand Book	B.A. Hauser	Lewis Publishers, New York	2011

WEB SITES:

www.springer.com
www.nptel.com
www.wikipedia.com
www.civil.ubc.ca

17BECEE035 RIVER ENGINEERING 3 0 0 3 100

OBJECTIVE:

1. At the end of this course the students will understand theoretical concepts of water and sediment movements in rivers and
2. To inculcate the benefits of fluvial system to the society
3. To Make observations and investigate hypotheses about river processes and the impacts of river engineering alternatives
4. To identify and justify appropriate engineering solutions
5. To formally document analyses and design recommendations
6. To discuss regional and global river systems and management

OUTCOMES:

1. At the end of this course the students will understand theoretical concepts of water and sediment movements in rivers and
2. to inculcate the benefits of fluvial system to the society
3. Make observations of and investigate hypotheses about river processes and the impacts of river engineering alternatives
4. Identify and justify appropriate engineering solutions
5. Formally document analyses and design recommendations
6. Discuss regional and global river systems and management

UNIT I RIVER FUNCTIONS 9

Primary function of a river – River uses and measures – Water and Sediment loads of river – Rivers in India, Himalaya and Peninsular.

UNIT II RIVER HYDRAULICS 9

Physical Properties and Equations – Steady flow in rivers – uniform and non uniform – Turbulence and velocity profiles – resistance co efficients – Boundary conditions and back waters – Transitions – Rating Curve – Unsteady flow in rivers : Propagative of surface waves – Characteristics, flood waves – knematic and diffusion analogy – velocity of propagation of flood waves – Flood wave –Maximum

UNIT III RIVER MECHANICS 9

River Equilibrium : Stability of Channel – regime relations – river bend equilibrium – hydraulic geometry of downstream - Bars and meandering - River dynamics – degradation and aggradation of river bed – Confluences and branches – River Data base.

UNIT IV RIVER SURVEYS AND MODEL 9

Mapping – Stage and Discharge Measurements – Sediments – Bed and suspended load – Physical hydraulic Similitude – Rigid and mobile bed – Mathematical – Finite one dimensional – multi – dimensional – Water Quality and ecological model

UNIT V RIVER MANAGEMENT 9

River training works and river regulation works – Flood plain management – waves and tides in Estuaries - Interlinking of rivers – River Stabilization

TOTAL: 45 HRS

TEXT BOOK

Name of the Book	Author Name	Publisher	Year
Principles of River Engineering	Janson PL.Ph., LvanBendegamJvanden Berg, Mdevries A. Zanen	Pitman	2011

REFERENCES:

Name of the Book	Author Name	Publisher	Year
River Mechanics	Pierre Y. Julien	Cambridge University Press	2002
INDIA's WATER WEALTH	K.L Rao	Orient Longman Ltd	2011

WEB SITES:

www.springer.com
www.nptel.com
www.wikipedia.com
www.civil.ubc.ca
www.aboutcivil.com

17BECEE036 PAVEMENT ENGINEERING 3 0 0 3 100

OBJECTIVE:

1. To design different new pavements and rehabilitate the existing roads using recent technology.
2. To get knowledge about types of rigid and flexible pavements.
3. To design of rigid pavements.
4. To design of flexible pavements.
5. To determine the causes of distress in rigid and flexible pavements.
6. To understand stabilization of pavements, testing and field control.

OUTCOMES:

1. Students are able to design different new pavements and rehabilitate the existing roads using recent technology.
2. Get knowledge about types of rigid and flexible pavements.
3. Able to design of rigid pavements.
4. Able to design of flexible pavements.
5. Determine the causes of distress in rigid and flexible pavements.
6. Understand stabilization of pavements, testing and field control.

UNIT I BASIC CONCEPTS 9

Pavements types – Historical developments - Approaches to pavement design –vehicle and traffic considerations – behavior of road materials under repeatedloading – Stresses and deflections in layered systems.

UNIT II FLEXIBLE PAVEMENT 9

Factors affecting flexible pavements – material characterization for analyticalpavement design – CBR and stabile meter tests – Resilient modulus – Fatiguesubsystem – failure criteria for bituminous pavements – IRC design guidelines.

UNIT III RIGID PAVEMENT 9

Factors affecting rigid pavements - Design procedures for rigid pavement – IRC guidelines – Airfield pavements. Highway pavements – CRC pavements.

UNIT IV PAVEMENT EVALUATION AND REHABILITATION 9

Pavement evaluation and rehabilitation, condition and evaluation surveys causes and types of distress – in flexible and rigid pavements – PSI models – Serviceability indexof rural roads – Overlay design, pavements maintenance management and construction.

UNIT V STABILIZATION OF SOILS FOR ROAD CONSTRUCTIONS 9

The need for a stabilized soil – Design criteria and choice of stabilizers – Testing and field control – Stabilization in India for rural roads – Use of Geosynthetics in road construction - Case studies.

TOTAL: 45 HRS

REFERENCES:

1. Wright, P.H., Highway Engineers, John Wiley & Sons, Inc., New York, 2004.

2. Khanna S.K and Justo C.E.G, Highway Engineering, Eighth Edition, New Chand and Brothers, Roorkee, 2001.

3. Yoder R.J and Witchak M.W., Principles of Pavement Design, John Wiley, 2000.

4. Croney, D., Design and Performance of Road Pavements, HMO Stationary Office, 2002.

5. Design and Specification of Rural Roads (Manual), Ministry of rural roads, Government of India, New Delhi, 2001.

6. Guidelines for the Design of Flexible Pavements, IRC:37 - 2001, The Indian roads Congress, New Delhi.

7. Guideline for the Design of Rigid Pavements for Highways, IRC:58-2008, The Indian Roads Congress, New Delhi.

8. O' Flaherty, C.A., Highway Engineering (Vol. 2), Edward Arnold Cp., 2002.

9. Bell. P.S., Developments in Highway Engineering, Applied Sciences publishers, 2014.

17BECEE037 QUALITY CONTROL AND SAFETY MANAGEMENT 3 0 0 3 100

OBJECTIVES:

1. To know the different organizations and the quality assurance techniques used in the organizations.
2. To know the codes and standards for the preparation of contract documents.
3. To gain the knowledge of quality control policies and different methods adopted for quality policies.
4. To know the factors influencing construction quality.
5. To know the needs of Quality Assurance and quality control.
6. To know about the Reliability and Probabilistic methods

OUTCOMES:

1. The different organizations and the quality assurance techniques used in the organizations.
2. The codes and standards for the preparation of contract documents.
3. The knowledge of quality control policies and different methods adopted for quality policies.
4. The factors influencing construction quality.
5. The needs of Quality Assurance and quality control.
6. The Reliability and Probabilistic methods

UNIT I **(9)**

Types of organizations-Inspection. control and enforcement -Quality Management Systems and method -Responsibilities and authorities In quality assurances and quality Control- Architects, engineers, contractors, and special consultants, Quality circle.

UNIT II **(9)**

Quality policy -Objectives and methods In Construction Industry -Consumers satisfaction, Economics-Time of Completion -Statistical tolerance -Taguchi's concept of quality -Codes and Standards -Documents -Contract and construction programming -Inspection procedures -Processes and products -Total QA I QC programme and cost implication.

UNIT III **(9)**

Objectives -Regularity agent, owner, design, contract and construction oriented objectives, methods - Techniques and needs of QA/QC -Different aspects of quality - Appraisals, Factors Influencing construction quality.

UNIT IV **(9)**

Critical, major failure aspects and failure mode analysis -Stability methods and tools, optimum design -Reliability testing- reliability coefficient and reliability prediction -Selection of new materials -Influence of drawings detailing, specification, standardization -Bid preparation- Reliability Based Design.

UNIT V **(9)**

Construction activity, environmental safety. Social and environmental factors- Natural causes and speed of Construction -Life cycle costing- Reliability and Probabilistic methods-Value engineering and value analysis

TOTAL: 45 HRS

TEXT BOOKS:

Name of the Book	Author Name	Publisher	Year
Construction Inspection Handbook -Quality Assurance and:Quality Control	James, J.O Brian	Van Nostrand, New York	2000
Fundamentals of Construction Management and Organization	Kwaku, A., Tenah, Jose. M. Guevara	Reston Publishing Co., Inc	2003

REFERENCE BOOKS:

Name of the Book	Author Name	Publisher	Year
Quality Planning and Analysis	Virginia, Juran Frank, J.M. and Gryna	Tata McGraw Hill	2004
Productivity Improvement in Construction	Clarkson H. Oglesby	McGraw-Hill	2013
The Management of Quality in Construction	John L. Ashford	E & F.N, Spon. New York	2003
Quality Improvement Techniques In Construction	Steven McCabe	Addison Wesley Longman Ltd	2009

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. http://www.icivilengineer.com
5. http://www.engineeringcivil.com/
6. http://www.aboutcivil.com/
7. http://www.engineersdaily.com

17BECEE038 SHORING, SCAFFOLDING AND FORM WORK 3 0 0 3 100

OBJECTIVES:

1. To study the materials associated with formwork
2. To study the design aspects of formwork under various requirements.
3. To study the planning and erection aspects of form work
4. To study about a few special types of forms
5. To know the design aspects and erection procedures.
6. TO know the materials and planning of scaffolding and form work.

OUTCOMES:

1. The materials associated with formwork
2. The design aspects of formwork under various requirements.
3. The planning and erection aspects of form work
4. Special types of forms
5. Design aspects and erection procedures.
6. The materials and planning of scaffolding and form work.

UNIT I (9)

Lumber - Types - Finish - Sheathing ratio -Working stresses -Repetitive member stress - Plywood - Types and grades -Textured surfaces and strength - Reconstituted wood -Steel -Aluminum -Form lining materials - Hardware and fasteners - Nails in Plywood -Bolts, lag screws and connectors - Bolt loads.

Design considerations- Live loads and Wind pressure -Concrete pressure on form work- Concrete density -Height of discharge -Temperature -Rate of Placing -Consistency of concrete - Vibration - Hydrostatic pressure and pressure distribution -Examples -Adjustment for non-standard conditions- Basic simplification - Beam forms -Slab forms- Column forms -Wall forms -Allowable stresses - Check for deflection, bending and lateral stability - Examples.

UNIT II (9)

Simple wood stresses -Slenderness ratio -Allowable load -Tubular steel shores -Patented shores -Site Preparation, Size and spacing -Steel Tower Frames -Safety practices -Horizontal shores -Ellis shores -Dayton sure grip and Baker Roos shores -Safway Symons shores-Dead shore -Raking and Flying shores.

Overall Planning -Detailed planning - Standard units - Corner units - Schedule - Planning at Tender stage - Development of basic system - Planning for maximum reuse - Planning examples - Site layout plan-Crane arrangements -Recheck plan details - Planning for safety

UNIT III (9)

Location of job mill -Storage -Equipment-Form for Wall footings -Column footings -Slab on grade and paving work -Highway and Airport paving - External vibration -Prefabricated panel systems - Giant forms -Curved wall forms -Tolerance for walls -Erections Practices -Column heads-Beam or girder forms - Suspended forms- Suggested Tolerances -Concrete Joint construction-Flying system

forms. Causes of failures -Case studies- Finish of exposed concrete -Design deficiencies -Safety factors -Stripping sequence - Reshore installation -Advantages of reshoring.

UNIT IV **(9)**

Shell forms -Design considerations -Loads -Building forms -Strength requirements -Tunnel forming components - Curb and gutter forms - Invert forms -Arch forms -Concrete placement methods - Cut and cover construction -Tolerances - Slip forms-Principles -Types -Advantages -Functions of various components-Planning -Safety in slip forms -Special structures built with slip form technique -Codal provisions

UNIT V **(9)**

Types of scaffolds -Putlog and Independent scaffold -Single pole scaffolds -Fixing ties- Spacing of ties - bracing -knots safety net -General safety requirements- Gantry and system scaffolds - Shuttering for Precast members and continuous casting forms.

TOTAL: 45 HRS

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
Formwork for Concrete Structures	Robert L. Peurifoy and Garold D. Oberlender	McGraw- Hill	2003

REFERENCE BOOKS

Name of the Book	Author Name	Publisher	Year
Formwork for Concrete	Austin. C.K	Cleaver- Hume Press ltd	2008
Slip Form Techniques	London Tudor Dinescu and Constantin Radulescu	Abacus Press	2003
Guide for Concrete Formwork	American Concrete Institute	Michigan	2002
Safety Requirements for Scaffolding	American National Standards Institute	Broadway, New York	2001
Technical Monograph for Formwork	Indian Concrete Institute		2003

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. http://www.icivilengineer.com
5. http://www.engineeringcivil.com/

17BECEE039 TOWN PLANNING AND ARCHITECTURE 3 0 0 3 100

OBJECTIVE:

1. To provide the basic knowledge on the principles of design of buildings relating to the environment and climate.
2. To examine the core challenges relating to the foundation of sustainable smart cities
3. To develop knowledge, understanding, and critical thinking related to smart, sustainable urban development
4. To learn different tools of sustainability planning
5. To study the principles and practice of sustainable development, within the context of planning.
6. To have a brief knowledge on the surveys used for town planning.

OUTCOMES:

1. The basic knowledge on the principles of design of buildings relating to the environment and climate.
2. Examine the core challenges relating to the foundation of sustainable smart cities
3. Knowledge, understanding, and critical thinking related to smart, sustainable urban development
4. Different tools of sustainability planning
5. Principles and practice of sustainable development, within the context of planning.
6. Knowledge on the surveys used for town planning.

UNIT I ARCHITECTURAL DESIGN 9

Architectural Design – an analysis – integration of function and aesthetics – Introduction to basic elements and principles of design.

UNIT II SITE PLANNING 9

Surveys – Site analysis – Development Control – Layout regulations- Layout design concepts.

UNIT III BUILDING TYPES 9

Residential, institutional, commercial and Industrial – Application of anthropometry and space standards-Inter relationships of functions – Safety standards – Building rules and regulations – Integration of building services – Interior design.

UNIT IV CLIMATE AND ENVIRONMENTAL RESPONSIVE DESIGN 9

Man and environment interaction- Factors that determine climate – Characteristics of climate types – Design for various climate types – Passive and active energy controls – Green building concept

UNIT V TOWN PLANNING 9

Planning – Definition, concepts and processes- Urban planning standards and zoning regulations- Urban renewal – Conservation – Principles of Landscape design

TOTAL: 45 HRS

REFERENCES:

1. Francis D.K. Ching, “Architecture: Form, Space and Order”, VNR, N.Y., 1999.
2. Givoni B., “Man Climate and Architecture”, Applied Science, Barking ESSEX, 1982.
3. Edward D.Mills, “Planning and Architects Handbook”, Butterworth, London, 1995.
4. Gallian B.Arthur and Simon Eisner, “The Urban Pattern – City Planning and Design”, Affiliated Press Pvt. Ltd., New Delhi, 1995.
5. Margaret Robert, “An Introduction to Town Planning Techniques”, Hutchinson, London, 1990.

17BECEE040 GEO ENVIRONMENTAL ENGINEERING 3 0 0 3 100

OBJECTIVE:

1. Have an exposure to interdisciplinary issues pertaining to environment and geotechnical engineering
2. Be trained to develop sustainable and environmentally sound solutions for geotechnical problems
3. To understand the relevance of various legal aspects involved in addressing environmental consequences associated with geotechnical issues.
4. To understand the Fundamentals of geo environmental engineering and multiphase behavior of soil.
5. To understand the Soil-water contaminant interaction studies and concepts of unsaturated soil in geo environmental engineering,
6. To understand the Waste containment system and also the property evaluation of soil, design practices, Vertical barriers

OUTCOMES:

1. Understand the Fundamentals of geo environmental engineering and multiphase behavior of soil.
2. Understand the Soil-water contaminant interaction studies and concepts of unsaturated soil in geo environmental engineering,
3. Understand the Waste containment system and also the property evaluation of soil, design practices, Vertical barriers,
4. Understand the Contaminant site remediation, some examples of in-situ remediation
5. Understand the Advanced soil characterization for geo environmental applications
6. Develop sustainable and environmentally sound solutions for geotechnical problems

UNIT I SOIL – POLLUTANT INTERACTION 9

Introduction to Geoenvironmental engineering – environmental cycle – sources,production and classification of waste – causes of soil pollution – factors governingsoil-pollutant interaction – failures of foundations due to pollutants – case studies.

UNIT II SITE SELECTION AND SAFE DISPOSAL OF WASTE 9

Safe disposal of waste – site selection for land fills – characterization of land fill sitesand waste - Risk assessment - . Stability of land fills – current practice of wastedisposal – monitoring facilities - passive containment system – application ofgeosynthetics in solid waste management – rigid or flexible liners.

UNIT III TRANSPORT OF CONTAMINANTS 9

Contaminant transport in sub surface – advection – diffusion – dispersion –governing equations – contaminant transformation – sorption – biodegradation – ionexchange – precipitation – hydrological consideration in land fill design – groundwater pollution – bearing capacity of compacted fills –

foundation for waste fill ground– pollution of aquifers by mixing of liquid waste – protecting aquifers.

UNIT IV WASTE STABILIZATION AND DISPOSAL 9

Hazardous waste control and storage system – stabilization/ solidification of wastes –micro and macro encapsulation – absorption, adsorption, precipitation - detoxification– mechanism of stabilization – organic and inorganic stabilization – utilization of solidwaste for soil improvement – case studies.

UNIT V REMEDIATION OF CONTAMINATED SOILS 9

Rational approach to evaluate and remediate contaminated sites – monitored naturalattenuation – exsitu and insitu remediation – solidification, bio – remediation,incineration, soil washing, electro kinetics, soil heating, vetrification, bio venting –Ground water remediation – pump and treat, air sparging, reactive well – case studies.

TOTAL: 45 HRS

REFERENCES:

1. Daniel B.E, Geotechnical Practice for waste disposal, Chapman &Hall,London, 2012.

2. Hari D. Sharma and Krishna R.Reddy, Geo-Environmental Engineering –John Wiley and Sons, INC, USA, 2004.

3. Westlake, K., Landfill Waste pollution and Control, Albion Publishing Ltd.,England, 1995.

4. Wentz, C.A., Hazardous Waste Management, McGraw Hill, Singapore, 2000.

5. Proceedings of the International symposium of Environmental Geotechnology(Vol.I and II), Environmental Publishing Company, 1986 and 1989.

LIST OF OPEN ELECTIVES

17BESHOE01, 17BTSHOE01 PROBABILITY AND RANDOM PROCESS 3 0 0 3

OBJECTIVES:

1. To gain knowledge in measures of central tendency.
2. To provide necessary basic concepts in probability and random processes for applications such as random signals, linear systems in communication engineering.
3. To understand the basic concepts of probability, one- and two-dimensional random variables and to introduce some standard distributions applicable to engineering which can describe real life phenomenon.
4. To understand the basic concepts of random processes which are widely used in IT fields.
5. To understand the concept of correlation, and spectral densities.
6. To make the student to solve Electrical Engineering problems.

COURSE OUTCOMES:

1. Learners acquire skills in handling situations involving more than one random variable and functions of random variables.
2. To understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
3. To understand the basic concepts of one- and two-dimensional random variables and apply in engineering applications.
4. To apply the concept random processes in engineering disciplines.
5. The students will have an exposure of various distribution functions and help in acquiring skills in handling situations involving more than one variable.
6. The students will have an exposure of various distribution functions, correlation and spectral densities.

UNIT- I MEASURES OF CENTRAL TENDENCY AND PROBABILITY (9)

Measures of central tendency – Mean, Median, Mode - Standard Deviation
Probability - Random variable - Axioms of probability - Conditional probability - Total probability – Baye's theorem.

UNIT- II STANDARD DISTRIBUTIONS (9)

Functions of a random variable - Binomial, Poisson, Uniform, Exponential, Gamma(one Parameter only) and Normal distributions - Moment generating functions, Characteristic function and theirproperties – Chebyshev's inequality.

UNIT -III TWO DIMENSIONAL RANDOM VARIABLES (9)

Joint distributions - Marginal and conditional distributions - Probability mass function - Probability density functions – Covariance - Correlation and regression

UNIT- IV CLASSIFICATION OF RANDOM PROCESS (9)

Definition and examples - first order, second order, strictly stationary, wide – sense stationary and Ergodic processes - Markov process - Binomial, Poisson and Normal processes - Sine wave process.

UNIT -VCORRELATION AND SPECTRAL DENSITIES (9)

Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener-Khintchine relation – Relationship between cross power spectrum and cross correlation function - Linear time invariant system - System transfer function –Linear systems with random inputs – Auto correlation and cross correlation functions of input and output.

TOTAL: 45 HRS

TEXT BOOK:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Peebles Jr, P.Z	Probability Random Variables and Random Signal Principles	Tata McGraw-Hill Pubishers, New Delhi.	2002

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Ross, S	A first Course in Probability	Pearson Education, New Delhi (Chap 2 to 8)	2012
2	Gupta, S.C. and Kapoor, V.K	Fundamentals of Mathematical Statistics	Sultan Chand and Sons, New Delhi.	2014
3	Veerarajan,T.	Probabilitiy, Statistics and Random process	Tata McGraw-Hill Education pvt. Ltd., New Delhi	2008
4	Henry Stark and John W. Woods	Probability and Random Processes with Applications to Signal Processing	Pearson Education, Third edition, Delhi	2002

WEBSITES:

1. www.cut-theknot.org/probability.shtml
2. www.mathcentre.ac.uk
3. www.mathworld. Wolfram.com

17BESHOE02, 17BTSHOE02 FUZZY MATHEMATICS 3 0 0 3

OBJECTIVES:

1. Be able to understand basic knowledge of fuzzy sets and fuzzy logic
2. Be able to apply basic knowledge of fuzzy operations.
3. To know the basic definitions of fuzzy relations
4. Be able to apply basic fuzzy inference and approximate reasoning
5. To know the applications of fuzzy Technology.
6. To applyfuzzy logic control to real time systems

COURSE OUTCOMES:

1. To gain the main subject of fuzzy sets.
2. To understand the concept of fuzziness involved in various systems and fuzzy set theory.
3. To gain the methods of fuzzy logic.
4. To comprehend the concepts of fuzzy relations.
5. To analyze the application of fuzzy logic control to real time systems.
6. The Engineers will have an exposure on various topics such as fuzzy algebra, fuzzy theory and fuzzy technology.

UNIT I FUZZY SETS (9)

Fuzzy Sets : Basics Classical sets vs Fuzzy Sets – Need for fuzzy sets – Definition and Mathematical representations – Level Sets – Fuzzy functions - Zadeh's Extension Principle

UNIT II OPERATIONS ON FUZZY SETS (9)

Operations on Fuzzy Sets Operations on [0,1] – Fuzzy negation, triangular norms, tconorms, fuzzy implications, Aggregation Operations, Fuzzy Functional Equations

UNIT III FUZZY RELATIONS (9)

Fuzzy Relations Fuzzy Binary and n-ary relations – composition of fuzzy relations – Fuzzy Equivalence Relations – Fuzzy Compatibility Relations – Fuzzy Relational Equations

UNIT IV FUZZY MEASURES (9)

Possibility Theory Fuzzy Measures – Evidence Theory – Necessity and Belief Measures – Probability Measures vs Possibility Measures

UNIT V FUZZY INFERENCE (9)

Approximate Reasoning Fuzzy Decision Making - Fuzzy Relational Inference – Compositional rule of Inference - Efficiency of Inference - Hierarchical

TOTAL: 45 HRS

TEXT BOOK:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	George J Klir and Bo Yuan	Fuzzy Sets and Fuzzy Logic : Theory and Applications	Prentice Hall of India, New Delhi.	2003

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Zimmermann H.J.	Fuzzy Set Theory and its Applications	Kluwer Academic publishers, USA.	2001
2	Michal Baczynski and BalasubramaniamJayaram	Fuzzy Implications	Springer-Verlag publishers, Heidelberg	2008
3	Kevin M Passino and Stephen Yurkovich	Fuzzy Control	Addison Wesley Longman publishers, USA	1998

WEBSITES:

1. www.mathcentre.ac.uk
2. www.mathworld. Wolfram.com
3. www.calvin.edu/~pribeiro/othrlnks/Fuzzy/fuzzysets.htm

17BESHOE03, 17BTSHOE03 LINEAR ALGEBRA 3 0 0 3

OBJECTIVES:

1. To introduce the basic concepts of vector space
2. To know the fundamentals of linear Algebra
3. To solve system of linear equations
4. To study about the linear transformations
5. To introduce the concepts of inner product spaces
6. To understand the concept of Linear Algebra and its applications.

COURSE OUTCOMES:

1. To explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.
2. To describe the fundamental concepts of Eigen values and Eigen vectors by using Power method.
3. To apply the fundamental concepts in their respective engineering fields
4. To visualize linear transformations as matrix form
5. To recognize the underlying theory of vector spaces over a field and inner product spaces over real or complex numbers
6. To articulate the importance of Linear Algebra and its applications in branches of Mathematics.

UNIT I VECTOR SPACES (9)

General vector spaces, real vector spaces, Euclidean n-space, subspaces, linear independence, basis and dimension, row space, column space and null space,

UNIT II EIGEN VALUES AND EIGEN VECTORS (9)

Eigen values and Eigen vectors - Diagonalization - Power method - QR decomposition

UNIT III SYSTEM OF LINEAR EQUATIONS (9)

Direct methods, Gauss elimination method, Gauss Jordan method, Crout's method, iterative methods, Gauss-Jacobi method, Gauss–Seidel method, convergence criteria.

UNIT IV LINEAR TRANSFORMATIONS (9)

Linear Transformations - The Null Space and Range - Isomorphisms - Matrix Representation of Linear Transformations – Similarity - Eigenvalues and Eigenvectors Eigen values and Eigen vectors - Diagonalization

UNIT V INNER PRODUCT SPACES (9)

The Dot Product on R^n and Inner Product Spaces - Orthonormal Bases - Orthogonal Complements - Application : Least Squares Approximation - Diagonalization of Symmetric M - Application: Quadratic Forms

TOTAL: 45 HRS

TEXT BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Kreyszig,E	Advanced Engineering Mathematics	John Wiley & Sons, New Delhi.	2014
2	Shahnaz Bathul	Text book of Engineering Mathematics(Special Functions and Complex Variables)	PHI Publications, New Delhi.	2009

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Kreyszig,E	Advanced Engineering Mathematics	John Wiley & Sons, New Delhi.	2014
2	Anton and Rorres	Elementary Linear Algebra, Applications version	Wiley India Edition, New Delhi.	2012
3	Jim Defranza, Daniel Gagliardi	Introduction to Linear Algebra with Application	Tata McGraw-Hill, New Delhi.	2008

WEBSITES:

1. www.sosmath.com
2. www.nptel.ac.in
3. www.mathworld.wolfram.com

17BESHOE04, 17BTSHOE04 ENGINEERING ACOUSTICS3 0 0 3

OBJECTIVES:

1. To disseminate the fundamentals of acoustic waves.
2. To inculcate the characteristics of radiation and reception of acoustic waves.
3. To divulge knowledge on the basics of pipe resonators and filters.
4. To introduce the features of architectural acoustics.
5. To impart the basic knowledge of transducers and receivers.
6. Toapply the knowledge inputs of the course for core engineering.

COURSE OUTCOMES:

1. Develop the idea of the fundamentals of acoustic waves.
2. Apply the concepts of radiation and reception of acoustic waves.
3. Explain the basic ideas of pipe resonators and filters.
4. Illusrate the basics of architectural acoustics.
5. Illustrate the transducers and receivers and its applications in various electronic devices.
6. Apply the knowledge inputs of the course for engineering applications.

UNIT I INTRODUCTION (9)

Acoustics waves – Linear wave equation – sound in fluids – Harmonic plane waves - Acoustics intensity – Specific acoustic impedance – spherical waves – Describer scales.Reflection and Transmission:Transmission from one fluid to another normal and oblique incidence –method of images.

UNIT II RADIATION AND RECEPTION OF ACOUSTIC WAVES (9)

Radiation from a pulsating sphere – Acoustic reciprocity – continuous line source radiation impedance - Fundamental properties of transducers.Absorption and attenuation of sound. Absorption from viscosity – complex sound speed and absorption – classical absorption coefficient

UNIT III PIPES RESONATORS AND FILTERS (9)

Resonance in pipes - standing wave pattern absorption of sound in pipes – long wavelength limit – Helmoltz resonator - acoustic impedance - reflection and transmission of waves in pipe - acoustic filters – low pass, high pass and band pass. Noise, Signal detection, Hearing and speech. Noise, spectrum level and band level – combing band levels and tones – detecting signals in noise – fundamental properties of hearing – loudness level and loudness – pitch and frequency – voice.

UNIT IV ARCHITECTURAL ACOUSTICS (9)

Sound in endosure – A simple model for the growth of sound in a room – reverberation time - Sabine, sound absorption materials – measurement of the acoustic output of sound sources in live rooms – acoustics factor in architectural design. Environmental Acoustics: Highway noise – noise induced hearing loss – noise and architectural design specification and measurement of some isolation design of portions.

UNIT V TRANSDUCTION (9)

Transducer as an electives network – canonical equation for the two simple transducers transmitters – moving coil loud speaker– horn loud speaker, receivers – condenser – microphone – moving coil electrodynamics microphone piezoelectric microphone – calibration of receivers

TOTAL: 45 HRS

TEXT BOOK:

S.No.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	LawerenceE.Kinsler, Austin R.Frey	Fundamentals of Acoustics	John Wiley & Sons	2000

REFERENCE:

S.No.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	F. AltonEverest & Ken Pohlmann	Master Handbook of Acoustics	McGraw Hill Professional	2014

WEBSITES:

1. www. acousticalsociety.org
2. www.acoustics-engineering.com
3. www.nptel.ac.in
4. www. ocw.mit.edu

17BESHOE05, 17BTSHOE05 SOLID WASTE MANAGEMENT 3 0 0 3

OBJECTIVES:

1. To make the students conversant with basics of Solid wastes and its classification.
2. To make the student acquire sound knowledge of different treatments of solid wastes.
3. To acquaint the student with concepts of waste disposals.
4. To develop an understanding of the basic concepts of Hazardous waste managements.
5. To acquaint the students with the basics of energy generation from waste materials.

COURSE OUTCOMES:

1. Outline the basic principles of Solid waste and separation of wastes (K).
2. Identify the concepts of treatment of solid wastes (S).
3. Identify the methods of wastes disposals. (S)
4. Examine the level of Hazardousness and its management. (S)
5. Examine the possible of the energy production using waste materials. (S)
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (A).

UNIT I SOLID WASTE (9)

Definitions – Sources, Types, Compositions, Properties of Solid Waste – Municipal Solid Waste – Physical, Chemical and Biological Property – Collection – Transfer Stations – Waste Minimization and Recycling of Municipal Waste

UNIT II WASTE TREATMENT (9)

Size Reduction – Aerobic Composting – Incineration – batch type and continuous flow type, Medical/ Pharmaceutical Waste Incineration – Environmental Impacts – Measures of Mitigate Environmental Effects due to Incineration

UNIT III WASTE DISPOSAL (9)

Sanitary Land Fill Method of Solid Waste Disposal – Land Fill Classficaition, Types, Methods &Siting Consideration – Layout & Preliminary Design of Land Fills – Composition, Characteristics generation, Movement and Control of Landfill Leachate & Gases – Environmental Monitoring System for Land Fill Gases, Waste landfill Remediation

UNIT IV HAZARDOUS WASTE MANAGEMENT (9)

Definition & Identification of Hazardous Waste – Sources and Nature of Hazardous Waste – Impact on Environment – Hazardous Waste Control – Minimization and Recycling -Assessment of Hazardous Waste Sites – Disposal of Hazardous Waste, Underground Storage Tanks Construction, Installation & Closure, Remediaiton, risk assessment.

UNIT V ENERGY GENERATION FROM WASTE (9)

Thermal conversion Technologies – Pyrolysis systems, Combustion systems, Gasification systems, Environment control systems, Energy recovery systems. Biological & Chemical conversion technologies – Aerobic composting, low solids. Anaerobic digestion, high solids anaerobic digestion, Energy production from biological conversion products, other biological transformation processes. Chemical transformation processes.

TOTAL: 45 HRS

TEXT BOOK:

S. No.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Dara.S.S,Mishra.D.D	A Text book of Environmental Chemistry and Pollution Control	S.Chand and Company Ltd., New Delhi.	2011

REFERENCES:

S. No.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Naomi B. Klinghoffer and Marco J. Castaldi	Waste to Energy Conversion Technology (Woodhead Publishing Series in Energy)	Woodhead Publishing Ltd., Cambridge, UK	2013
2.	Frank Kreith, George Tchobanoglous	Hand Book of Solid Waste Management- 2nd edition	McGraw Hill Publishing Ltd., Newyork	2002
3.	Shah, L Kanti	Basics of Solid & Hazardous Waste Management Technology	Prentice Hall (P) Ltd., New Delhi.	1999

WEBSITES:

1.www.iitk.ac.in/3inetwork/html/reports/IIR2006/Solid_Waste.
2.http://www.unep.or.jp/ietc/ESTdir/Pub/MSW/
3.www.alternative-energy-news.info/technology/garbage-energy/
4.nzic.org.nz/ChemProcesses/environment/

17BESHOE06, 17BTSHOE06 GREEN CHEMISTRY 3 0 0 3

OBJECTIVES:

1. To make the students conversant about the green chemistry
2. To make the student acquire sound knowledge of the atom efficient process and synthesis elaborately.
3. To acquaint the student with concepts of green technology.
4. To develop an understanding of the basic concepts of renewable energy resources.
5. To acquaint the students with the basic'sinformation on catalysis.
6. To apply the concepts of green catalysts in the synthesis

COURSE OUTCOMES:

1. Outline the basic principles of green chemistry (K).
2. Examine the different atom efficient process and synthesis elaborately (S).
3. Apply the concepts combustion of green technology (S).
4. Identify and apply the concepts of renewable energy (S).
5. Apply the concepts of green catalysts in the synthesis (S).
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I INTRODUCTION TO GREEN CHEMICAL PRINCIPLES (9)

Definition, tools, and twelve principles of green chemistry, solvent-less reactions and reactions in water, microwaves and fluorous solvents, green resolution of racemic mixtures, materials for a sustainable economy, chemistry of longer wear, agrochemicals: problems and green alternate solutions.

UNIT II ATOM EFFICIENT PROCESSES (9)

Atom efficient processes, evaluating chemical reagents according to their yield and atom efficiency, examples of efficient stoichiometric and catalytic processes, atom economy and homogeneous catalysis, halide-free synthesis and alternatives to Strecker synthesis.

UNIT III BIOTECHNOLOGY AND GREEN CHEMISTRY (9)

Bio technology and its applications in environmental protection-Bio informatics-Bio remediation, biological purification of contaminated air. Green chemistry for clean technology-Significance of green chemistry-Basic components of green chemistry, Industrial applications of green chemistry, green fuels-e-green propellants and bio catalysts.

UNIT IV RENEWABLE RESOURCES (9)

Use of renewable materials, evaluating feedstock and starting materials and their origins, toxicity, sustainability and the downstream implications of the choice of feedstock, commodity chemicals from glucose and biomass conversion.

UNIT V CATALYSIS IN GREEN CHEMISTRY (9)

Catalysis, energy requirements and usage, optimization of the reaction by minimizing the energy requirements, examples of efficient catalytic reactions including the use of heterogeneous catalysis, zeolites, oxidation using molecular oxygen.

TOTAL: 45 HRS

TEXT BOOKS:

S. No.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Sanjay K. Sharma, AckmezMudhoo	Green Chemistry for Environmental Sustainability	CRC Press , London	2010
2.	Ahluwalia V. K. and M.Kidwai	New Trends in Green Chemistry 2nd edition	Anamaya publishers., New Delhi.	2007

REFERENCES:

S. No.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Dr. Sunita Ratan	A Textbook of Engineering Chemistry	S.K. Kataria and Sons., New Delhi.	2012
2.	Mukesh Doble. Ken Rollins, Anil Kumar	Green Chemistry and Engineering, 1st edition	Academic Press, Elesevier., New Delhi.	2007
3.	Desai K. R.	Green Chemistry	Himalaya Publishing House, Mumbai.	2005
4.	Matlack A. S.	Introduction to Green Chemistry	Marcel Dekker: New York	2001

WEBSITES:

1.http://www.organic-chemistry.org/topics/green-chemistry.shtm
2.http://www.essentialchemicalindustry.org/processes/green-chemistry.html
3. http://www.chm.bris.ac.uk/webprojects2004/vickery/green_solvents.htm
4. http://www.epa.gov/research/greenchemistry/
5. http://www.amazon.in/Green-Chemistry-Catalysis

17BESHOE07, 17BTSHOE07 APPLIED ELECTROCHEMISTRY 3 0 0 3

OBJECTIVES:

1. To get the information on electrochemical material.
2. To study about the conducting polymers.
3. To acquaint the student with concepts of Energy storage devices.
4. To gain knowledge on the batteries and power sources.
5. To develop energy storage devices.
6. To understand the chemical principles in the projects undertaken in field of engineering.

COURSE OUTCOMES:

1. Outline the basic principles of chemistry in **electrochemical material (K).**
2. Examine the properties of conducting polymers (S).
3. Apply the concepts of electrochemistry in storage devices. (S)
4. Identify the concepts of storage devices and its applications. (S)
5. Apply the suitable materials for the manufacturing of storage devices. (S)
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I METAL FINISHING (9)

Fundamental principles, surface preparation-Electroplating of copper, nickel, chromium, zinc and precious metals (gold & silver)- Electroplating for electronic industry- Alloy plating, brass plating- Electro less plating of nickel- anodizing – Electroforming – Electro winning.

UNIT II CONDUCTING POLYMERS AND ELECTROCHEMICALS (9)

Lector polymerisation- anodic and cathodic polymerization-effect of reaction parameters on the course of the reaction- Electrochemical preparation of conducting polymers- poly acetylene- Electrolytic production of perchlorates and manganese dioxide- Electro organic chemicals- constant current electrolysis.

UNIT III BATTERIES AND POWER SOURCES-I (9)

Principles of energy conservation- electrochemical energy conservation- thermodynamic reversibility, Gibbs equation. EMF- battery terminology, energy and power density- Properties of anodes, cathodes, electrolytes and separators- Types of electrolytes.

UNIT IV BATTERIES AND POWER SOURCES-II (9)

Primary batteries- Dry Leclanche cells, alkaline primary batteries, Lithium batteries, Lithium ion batteries- construction, characteristics, problems associated with system- Secondary batteries- Lead acid, nickel cadmium- Fuel cells- Introduction, types of fuel cells, advantages.

UNIT V ELECTROCHEMICAL MATERIAL SCIENCE (9)

Solar cells- Preparation of CdS/Cu_2S solar cells by screen printing techniques and their characteristics - Amorphous silicon solar cells - Photo electrochemical cells(PEC) for conversion of light energy to electrical energy - PEC cells based on Cd/Se and Ga/As characteristics.

TOTAL: 45 HRS

TEXT BOOKS:

S. No.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Cynthia G. Zoski	Hand Book of Electrochemistry	Academic Press, Elesevier., UK	2007
2.	D.Pletcher and F.C.Walsh	Industrial Electrochemistry	Chapman and Hall, London	1990

REFERENCES:

S. No.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	M. Barak	Electrochemical Power Sources	I.EEE series, Peter Peregrinius Ltd, Steverage, U.K.	1997
2.	Bruno Scrosati	Applications of Electroactive Polymers	Chapman & Hall, London	1993
3.	K.L. Chopra and I. Kaur	Thin Film Devices and their Application	Plenum Press, New York.	1983
4.	M.M.Baizer	Organic Electrochemistry	Dekker Inc. New York	1983

WEBSITES:

1. http://www.anoplate.com/finishes/
2. http://hyperphysics.phy-astr.gsu.edu/hbase/electric/battery.html
3. http://inventors.about.com/od/sstartinventions/a/solar_cell.htm

17BESHOE08, 17BTSHOE08 INDUSTRIAL CHEMISTRY 3 0 0 3

OBJECTIVES:

1. To make the students conversant with **cement and lime** and its uses.
2. To make the student acquire sound knowledge of abrasives and refractories.
3. To acquaint the student with concepts of inorganic chemicals.
4. To develop an understanding of the basic concepts**explosives**.
5. To acquaint the students with the basics of **agriculture chemicals**.
6. To understand the chemical principles in the projects undertaken in field of engineering.

COURSE OUTCOMES:

1. Outline the basic chemistry of **cement and lime (K).**
2. Examine the uses of abrasives and refractories (S).
3. Identify the usage of the inorganic chemicals. (S)
4. Identify the concepts of explosives and smoke screens (S).
5. Identify the usage of the **agriculture** chemicals (S).
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (A).

UNIT I CEMENT AND LIME (9)

Manufacture of Portland cement – settling of hardening of portland cement – regauging cement – effect of fineness on setting and hardening – freezing – high early strength cement – high alumina cement Lime – raw materials- manufacture – slaking – lime mortar – types of lime – high – calcium or fat lime – calcium lime or lean lime – magnesian lime – dolomitic lime – hydraulic lime.

UNIT II ABRASIVES AND REFRACTORIES (9)

Abrasives – hard abrasives – siliceous abrasives – soft abrasives – artificial abrasives – uses. Refractories – definition – classification – acid refractories – basic refractories – neutral refractories – properties – uses.

UNIT IIIINORGANIC CHEMICALS (9)

Common salt and soda ash – manufacture – different grades – products – alkalis – Na_2CO_3, caustic soda and chlor-alkali industry – manufacture principles of electrolytic process – chlorine – storage. Hydrochloric acid – manufacture – absorption – uses, sulphur and sulphuric acid – extraction of sulphur – manufacture of H_2SO_4 – chamber – contact processes – industrial uses.

UNIT IV EXPLOSIVES (9)

Explosives – uses – properties and tests – explosives for war – nitrocellulose – picric acid and T.N.T. – industrial explosives – nitroglycerin and dynamites – black powder – smoke screens – incendiaries – gas mask.

UNIT V AGRICULTURE CHEMICALS (9)

Fertilizers – organic and inorganic – ammoniated superphosphates, sodium nitrate, solid pellets – potassium salts – pesticides – fungicides – herbicides – their preparations and characteristics – environmental impacts.

TOTAL: 45 HRS

TEXT BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Harikrishan	Industrial Chemistry	Goel Publishing House, Meerut.	2014
2.	B.K. Sharma	Industrial Chemistry	Goel Publishing House, Meerut.	2000

REFERENCE BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	B.N.Chakrabarty	Industrial Chemistry	Oxford and IBH Publishing CO. New Delhi.	1998
2.	James A. Kent	Hand Book of Industrial Chemistry, 9^{th} edition	Van Nostrand Reinhold, New York.	1992
3.	R.N. Sherve	Chemical Process Industries	McGraw-Hill, Kugakuisha Ltd., Tokyo.	1984
4.	S.D. Shukla and G.N. Pandy	A Text book of Chemical Technology	Vikas Publishing House (P) Ltd, New Delhi.	1979

WEBSITES:

1.http://en.wikipedia.org/wiki/Cement
2. http://www.hon.ch/HONselect/Selection/D01.html
3. http://fas.org/man/dod-101/navy/docs/fun/part12.htm
4. http://toxics.usgs.gov/topics/agchemicals.html

OBJECTIVES:

1. Develop abilities to write technically and expressively.
2. Recognize writing as a constructive, meaningful process.
3. Practice using reading strategies for effective writing.
4. Design effective technical documents for both print and digital media.
5. Identify the qualities of good technical writing.
6. To enrich their reading ability for effective writing.

COURSE OUTCOMES:

1. Construct simple sentences, correct common grammatical errors in written English.
2. Develop confidence in English language by imbibing lexical and syntax rules.
3. Enrich their reading ability for effective writing.
4. Elevate them to minimize word, sentence, and paragraph length without sacrificing clarity or substance
5. Familiarize with basic technical writing concepts and terms, such as audience analysis, jargon, format, visuals, and presentation.
6. Demonstrate the basic components of definitions, descriptions, process explanations, and other common forms of technical writing.

UNIT – I BASICS OF WRITING 9

Introduction to Technical Writing – Importance of Writing – Characteristics of Writing– Audience Recognition/ Analysis – Appropriateness of language — Conciseness and Flow– Bias free and plain writing – Impersonal and Formal Language -Techniques of Technical Writing– Overcoming writer's block – Prioritizing for effective writing– Avoiding plagiarism.

UNIT – 2 PARAGRAPHS AND ESSAYS 9

Expressing Ideas – Paragraph construction – Cohesion and Coherence – Adequate development – Kinds of paragraphs – Writing drafts – Paragraph length and pattern – Types of Essays – Characteristics of Essays – Salient point of sentence constructions.

UNIT – 3 LETTERS, MEMOS AND EMAIL 9

Formal written correspondence – Types of messages – Business letters – Structure of letters – Language in letters – Tense in letters – Cover letters – Resumes – Curriculum vitae – Memos – Emails – Email Etiquette – Effectiveness and purpose.

UNIT – 4 THE ART OF CONDENSATION AND TECHNICAL PROPOSALS 9

Steps to Effective précis writing – Guidelines – Technical Proposals – Types of Proposals – Characteristics – Body of the Proposals – Style and appearance – Evaluation of proposals – Proof Reading – Book /Film Review – Travelogue – Dialogue Writing.

UNIT – 5 REPORTS AND RESEARCH ARTICLES 9

Discussion of newspaper articles -Objectives of Reports – Characteristics of Reports – Structure of Reports – Types of Reports – Writing an article – Writing research articles – Essential features of Dissertation – Organizing the structure of thesis and articles – Writing technical description.

TOTAL: 45 HRS

TEXT BOOKS:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	V.N. Arora & Lakshmi Chandra	Improve Your Writing: Revised First Edition	OUP	2014

REFERENCES:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Crème, P. and M. Lea.	Writing at University: A guide for students.	OUP	2003
2	Graham King	Collins Improve Your Writing	Collins; First edition	2009
3	David Morley	The Cambridge Intro. To Creative Writing	Cambridge	2008

WEBSITES:

http://www.stevepavlina.com/blog/2006/08/10-ways-to-improve-your-technical-skills/
http://www.nyu.edu/classes/keefer/brain/net2.html
https://www.udemy.com/technical-writing-and-editing/
http://techwhirl.com/what-is-technical-writing/

17BECSOE01 INTERNET PROGRAMMING 3 0 0 3

COURSE OBJECTIVES:

1. To study concepts of Internet, IP addresses and protocols
2. To explain the concept of web page development through HTML
3. To introduce the PERL and explore its current strengths and Weaknesses
4. To write working Java code to demonstrate the use of applets for client-side programming
5. To study Internet telephony and various multimedia applications
6. To Elaborate on the principles of web page development

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

1. Learn the advanced concepts& techniques of Internet and Java.
2. Analyze the requirements for and create and implement the principles of web page development
3. Understand the concepts of PERL
4. Implement client-side programming using java applets
5. Generate internet telephony based upon advanced concepts
6. Develop applications on internet programming based on java applets and scripts

UNIT I Introduction 9

Introduction - Network of Networks, Intranet, Extranet and Internet. World Wide Web- Domain and Sub domain, Address Resolution, DNS, Telnet, FTP, HTTP. TCP/IP- Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control, IP Datagram, IPv4 and IPv6. IP Subnetting and addressing- Classful and Classless Addressing, Subnetting

UNIT II HTML 9

Introduction, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, Iframe, Colors, Colorname, Colorvalue. Image Maps- map, area, attributes of image area- Extensible Markup Language (XML)- Introduction, Tree, Syntax, Elements, Attributes, Validation, Viewing. XHTML in brief. CGI Scripts- Introduction- Environment Variable, GET and POST Methods.

UNIT III PERL 9

Introduction, Variable, Condition, Loop, Array, Implementing data structure, Hash, String, Regular Expression, File handling, I/O handling- JavaScript- Basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array, Boolean, reg-ex. Function, Errors, Validation. Cookies- Definition of cookies, Create and Store a cookie with example. Java Applets- Container Class, Components, Applet Life Cycle, Update method, Applications.

UNIT IV Client-Server programming 9

Client-Server programming In Java - Java Socket, Java RMI. Threats - Malicious code-viruses, Trojan horses, worms; eavesdropping, spoofing, modification, denial of service attacks- Network security techniques- Password and Authentication- VPN, IP Security, security in electronic transaction, Secure Socket Layer (SSL), Secure Shell (SSH). Firewall- Introduction, Packet filtering, Stateful, Application layer, Proxy.

UNIT V Internet Telephony 9

Introduction, VoIP- Multimedia Applications- Multimedia over IP: RSVP, RTP, RTCP and RTSP- Streaming media, Codec and Plugins, IPTV- Search Engine and Web Crawler- Definition, Meta data, Web Crawler, Indexing, Page rank, overview of SEO.

TOTAL: 45 HRS

Text Books:

1. Paul Deitel, Harvey Deitel and Abby Deitel, "Internet and World Wide Web-How to Program", 5th Edition, 2011.

2. Web Technology: A Developer's Perspective, N.P. Gopalan and J. Akilandeswari, PHI Learning, Delhi, 2013.

References:

1. Rahul Banerjee, Internetworking Technologies, An Engineering Perspective, PHI Learning, Delhi, 2011.

2. Robert W. Sebesta, "Programming the World Wide Web", Pearson Education, 2016

		L	T	P	C
17BECSOE02	**MULTIMEDIA AND ANIMATION**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES:

1. To impart the fundamental concepts of Computer Animation and Multimedia
2. To study the graphic techniques and algorithms using flash
3. Explain various concepts available in 3D animation
4. Explain various devices available for animation
5. To study the multimedia concepts and various I/O technologies for concept development
6. To understand the three-dimensional graphics and their transformations

COURSE OUTCOMES

Upon completion of this course, the student will be able to:

1. Develop their creativity using animation and multimedia
2. Understand the concepts of Flash and able to develop animation using it
3. Understand about various latest interactive 3D animation concepts
4. Know the various devices and software available in motion capture
5. Understand the concept development process
6. Develop an interactive multimedia presentation by using multimedia devices and identify theoretical and practical aspects in designing multimedia applications surrounding the emergence of multimedia technology.

UNIT I Introduction 9

What is mean by Animation – Why we need Animation – History of Animation– Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects -Creating Animation.

UNIT II Creating Animation in Flash 9

Introduction to Flash Animation – Introduction to Flash – Working with the Timeline and Frame-based Animation - Working with the Timeline and Tween-based Animation – Understanding Layers - Action script.

UNIT III 3D Animation & its Concepts 9

Types of 3D Animation – Skeleton & Kinetic 3D Animation – Texturing & Lighting of 3D Animation – 3D Camera Tracking – Applications & Software of 3D Animation.

UNIT IV Motion Caption 9

Formats – Methods – Usages – Expression – Motion Capture Software's – Script Animation Usage – Different Language of Script Animation Among the Software.

UNIT V Concept Development 9

Story Developing – Audio & Video – Color Model – Device Independent Color Model – Gamma and Gamma Correction - Production Budgets- 3D Animated Movies.

TOTAL: 45 HRS

Text Books:

1. Computer Graphics, Multimedia and Animation-Malay K. Pakhira,PHI Learning PVT Ltd,2010

References:

1. Principles of Multimedia – Ranjan Parekh, 2007, TMH. (Unit I, Unit V)
2. Multimedia Technologies – Ashok Banerji, Ananda Mohan Ghosh – McGraw Hill Publication.
3. Encyclopedia of Multimedia and Animations-Pankaj Dhaka, Anmol Publications-2011

17BECSOE03 PC HARDWARE AND TROUBLE SHOOTING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To study the basic parts of computer in detail
2. Introduce various peripheral devices available for computer and its detailed working concepts
3. Overview of various interfaces and other hardware overview
4. Assemble/setup and upgrade personal computer systems and discuss about power supplies and the skills to trouble-shoot various power-related problems.
5. To study basic concepts and methods in troubleshooting
6. To study the installation/connection and maintenance of computer and its associated peripherals.

COURSE OUTCOME:

Upon completion of this course, the student will be able to:

1. Identify the main components for the PC, familiarize themselves with PC memories such as RAM and ROM devices and so on.
2. Identify various peripheral devices available and its working
3. Understand various concepts of hardware and its interface and control
4. Perform basic installation of PC. Importance of maintenance is understood
5. Understand Various faults and failures are identified and troubleshooting in detail
6. Understand overall PC hardware, interfacing, maintenance and troubleshooting

UNIT I Introduction 9

Introduction - Computer Organization – Number Systems and Codes – Memory – ALU – CU – Instruction prefetch – Interrupts – I/O Techniques – Device Controllers – Error Detection Techniques – Microprocessor – Personal Computer Concepts – Advanced System Concepts – Microcomputer Concepts – OS – Multitasking and Multiprogramming – Virtual Memory – Cache Memory – Modern PC and User.

UNIT II Peripheral Devices 9

Introduction – Keyboard – CRT Display Monitor – Printer – Magnetic Storage Devices – FDD – HDD – Special Types of Disk Drives – Mouse and Trackball – Modem – Fax-Modem – CD ROM Drive – Scanner – Digital Camera – DVD – Special Peripherals.

UNIT III PC Hardware Overview 9

Introduction – Hardware BIOS DOS Interaction – The PC family – PC hardware – Inside the System Box – Motherboard Logic – Memory Space – Peripheral Interfaces and Controllers – Keyboard Interface – CRT Display interface – FDC – HDC.

UNIT IV Installation and Preventive Maintenance 9

Introduction – system configuration – pre installation planning – Installation practice – routine checks – PC Assembling and integration – BIOS setup – Engineering versions and compatibility – preventive maintenance – DOS – Virus – Data Recovery.

UNIT V Troubleshooting 9

Introduction – computer faults – Nature of faults – Types of faults – Diagnostic programs and tools – Microprocessor and Firmware – Programmable LSI's – Bus Faults – Faults Elimination process – Systematic Troubleshooting – Symptoms observation and analysis – fault diagnosis – fault rectification

– Troubleshooting levels – FDD, HDD, CD ROM Problems.

TOTAL: 45 HRS

Text Books:

1. B. Govindarajalu, “IBM PC Clones Hardware, Troubleshooting and Maintenance”, 2/E, TMH, 2002.

References:

1. Peter Abel, Niyaz Nizamuddin, “IMB PC Assembly Language and Programming”, Pearson Education, 2007
2. Scott Mueller, “Repairing PC's”, PHI, 1992

17BECSOE04	JAVA PROGRAMMING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

1. To understand Object Oriented Programming concepts and basic characteristics of Java
2. To know the principles of packages, inheritance and interfaces
3. To define exceptions and use I/O streams
4. To develop a java application with threads, generics classes and swings
5. To explain the need for generic programming
6. To design and build simple Graphical User Interfaces

COURSE OUTCOMES:

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

1. Develop Java programs using OOP principles
2. Develop Java programs with the concepts of inheritance and interfaces
3. Build Java applications using exceptions and I/O streams
4. Develop Java applications with threads and generics classes and swings
5. Understand various aspects for motivation of generic programming
6. Develop various interactive Java programs using OOP concepts of Java

UNIT I INTRODUCTION TO JAVA **9**

Object oriented programming concepts – objects – classes – methods and messages –abstraction and encapsulation – inheritance – abstract classes – polymorphism.- Objects and classes in Java – defining classes – methods - access specifiers – static members –constructors – finalize method

UNIT II PACKAGES **9**

Arrays – Strings - Packages – Java-Doc comments –- Inheritance – class hierarchy –polymorphism – dynamic binding – final keyword – abstract classes

UNIT III I/O STREAMS **9**

The Object class – Reflection – interfaces – object cloning – inner classes – proxies - I/O Streams - Graphics programming – Frame – Components – working with 2D shapes.

UNIT IV EXCEPTION HANDLING **9**

Exceptions – Syntax of exception handling code – Multiple catch statements – Using finally statements – Throwing our own exceptions – Using exceptions for debugging

UNIT V THREADS **9**

Introduction, Creating Threads, The Life Cycle of a Thread, Thread Methods, Using Threads, Synchronization of Threads, Summary **TOTAL: 45 HRS**

TEXT BOOKS:

1. Cay S. Horstmann and Gary Cornell Core Java: Volume I–Fundamentals Sun Microsystems Press 2008

REFERENCE BOOKS:

1. K. Arnold and J. Gosling The JAVA programming language Third edition, Pearson Education, 2009

2. Timothy Budd Understanding Object-oriented programming with Java Updated Edition, Pearson Education 2002

3. C. Thomas Wu An introduction to Object-oriented programming with Java Fourth Edition, Tata McGraw-Hill Publishing company Ltd., 2008

WEBSITES:

http://elvis.rowan.edu/~kay/cpp/vc6_tutorial/
http://www.winprog.org/tutorial/msvc.html
http://www.tutorialized.com/tutorials/Visual-C/1
http://www.freeprogrammingresources.com/visualcpp.html

17BEEEOE01 ELECTRIC HYBRID VEHICLE L T P C 3 0 0 3

Course Objectives

1. To understand the basic concepts of electric hybrid vehicle.
2. To gain the knowledge about electric propulsion unit.
3. To gain the concept of Hybrid Electric Drive-Trains.
4. To gain the different Energy Management Strategies.
5. To study about the efficiency manipulation in drives
6. To understand and gain the knowledge about various energy storage devices

Course Outcomes:

1. Summarize the basic concepts in bioprocess Engineering.
2. Explain the concept of Hybrid Electric Vehicles.
3. Understand the concept of Hybrid Electric Drive-Trains.
4. Identify the different Energy Management Strategies.
5. Understand the concept of different Energy Storage devices.
6. Analyze the different motor drives used in Hybrid Electric Vehicles

UNIT I INTRODUCTION 9

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT II HYBRID ELECTRIC DRIVE-TRAINS 9

Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

UNIT III ELECTRIC PROPULSION UNIT 9

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

UNIT IV ENERGY STORAGE 9

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices.

UNIT V ENERGY MANAGEMENT STRATEGIES 9

Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies.

TOTAL: 45 HRS

17BEEEOE02 ENERGY MANAGEMENT AND ENERGY AUDITING L T P C 3 0 0 3

Course Objectives:

1. To gain the knowledge about energy management.
2. To understand the basic concepts in economic analysis in energy management.
3. To understand the basic principles of energy audit.
4. To gain the knowledge about the basic concept of types of Energy Audit
5. To gain and Evaluate the different energy efficient motors
6. Understand the concept of Energy conservation.
7. To study about the behaviour changes of PF requirement in motor currents

Course Outcomes:

At the end of this course, students will demonstrate the ability to

1. Understand the concept of Energy Management.
2. Analyze the different methods for economic analysis
3. Knowledge about the basic concept of Energy Audit and types.
4. Evaluate the different energy efficient motors
5. Understand the concept of Energy conservation.
6. Investigate the different methods to improve power factor.

UNIT I ENERGY MANAGEMENT 9

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting –Energy Auditor and Energy Manager – Eligibility, Qualification and functions - Questionnaire and check list for top management.

UNIT II ECONOMIC ASPECTS AND ANALYSIS 9

Economics analysis – Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis - Calculation of simple payback method, net present worth method.

UNIT III BASIC PRINCIPLES OF ENERGY AUDIT 9

Energy audit – definition, concept, type of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes – Energy audit of industries – energy saving potential, energy audit of process industry, thermal power station, building energy audit.

UNIT IV ENERGY EFFICIENT MOTORS 9

Electric Motors: Factors affecting efficiency - Energy efficient motors - constructional details, characteristics - voltage variation –over motoring – motor energy audit-

Energy conservation: Importance-energy saving measures in DG set-fans and blowers pumps- air conditioning system- energy efficient transformers.

UNIT V POWER FACTOR IMPROVEMENT, LIGHTING AND ENERGY INSTRUMENTS 9

Power factor - methods of improvement, location of capacitors, p.f with non linear loads, effect of harmonics on p.f,- p.f motor controllers –Energy efficient lighting system design and practice- lighting control– Measuring Instruments – wattmeter, data loggers, thermocouples, pyrometers, lux meters, tong testers, application of PLCs.

TOTAL: 45 HRS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Murphy W.R. and G.Mckay Butter worth	Energy Management	Heinemann Publications	2007

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	John.C.Andreas	Energy Efficient Electric Motors	Marcel Dekker Inc Ltd – 3rd edition	2005
2	W.C.Turner Steve Doty	Energy Management Handbook	Lulu Enterprises, Inc. - 8th Edition Volume II	2013

17BEEEOE03 PROGRAMMABLE LOGIC CONTROLLER L T P C 3 0 0 3

Course Objectives

1. To understand the basic principles of PLC systems.
2. To gain the knowledge about data handling functions.
3. To gain the knowledge of storage techniques in PLC
4. To acquire the knowledge about how to handle the data and functions
5. To study about flow charts of ladder and spray process system
6. To understand the principles of PID.

Course Outcome

1. At the end of the course the student will be able to understand the registers and functions in PLC and they are able to do the program.
2. To acquire the knowledge of storage techniques in PLC
3. Students know how to handle the data and functions
4. Students known about advanced controller in PLC applications
5. Students gather real time industrial application of PLC
6. Students gathered and evaluate the flow charts of ladder and spray process system

UNIT I INTRODUCTION 9

PLC Basics PLC system, I/O modules and interfacing CPU processor programming equipment Programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

UNIT II PLC PROGRAMMING 9

PLC Programming input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill-press operation. Digital logic gates programming in the Boolean algebra system, conversion examples Ladder diagrams for process control Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system.

UNIT III REGISTERS AND PLC FUNCTIONS 9

PLC Registers: Characteristics of Registers module addressing holding registers input registers, output registers. PLC Functions Timer functions and industrial applications counters counter function industrial applications, Architecture functions, Number comparison functions, number conversion functions.

UNIT IV DATA HANDLING FUNCTIONS 9

Data handling functions: SKIP, Master control Relay Jump Move FIFO, FAL, ONS, CLR and Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two axes and three axis Robots with PLC, Matrix functions.

UNIT V PID PRINCIPLES 9

Analog PLC operation: Analog modules and systems Analog signal processing multi bit data processing , analog output application examples, PID principles position indicator with PID control, PID modules, PID tuning, PID functions

TOTAL: 45 HRS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	JR Hackworth and F.D Hackworth – Jr	Programmable Logic Controllers – Programming Method and Applications	Pearson	2006

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	John Webb and Ronald A Reiss	Programmable Logic Controllers – Principle and Applications	Fifth edition, PHI	2004
2	W.Bolton	Programmable Logic controller	Elsevier Newnes Publications, 5th Edition	2009

WEBSITE

http://www.mikroe.com/old/books/plcbook/chapter1/chapter1.htm,- Introduction to programmable Logic controller

17BEEEOE04 RENEWABLE ENERGY RESOURCES L T P C 3 0 0 3

Course Objectives

1. To gain the knowledge about environmental aspects of energy utilization.
2. To understand the basic principles of wind energy conversion, solar cells, photovoltaic conversion.
3. To study about solar energy collectors and its storages
4. To study about the inter connected system in wind power
5. To understand the basic principles fuel cell, Geo thermal power plants.
6. To gain the knowledge about hydro energy.

Course Outcomes

At the end of this course, students will demonstrate the ability to

1. Analyze the Energy Scenario in india
2. Understand the concept of Solar Energy
3. Understand the concept of Wind Energy
4. Understand the concept of Hydro Energy
5. Analyze the different energy sources
6. Students gathered the real time inter connected system modelling in wind power

UNIT I INTRODUCTION 9

Energy scenario - Different types of Renewable Energy Sources - Environmental aspects of energy utilization - Energy Conservation and Energy Efficiency - Needs and Advantages, Energy Conservation Act 2003.

UNIT II SOLAR ENERGY 9

Introduction to solar energy: solar radiation, availability, measurement and estimation– Solar thermal conversion devices and storage – solar cells and photovoltaic conversion – PV systems – MPPT. Applications of PV Systems – solar energy collectors and storage.

UNIT III WIND ENERGY 9

Introduction – Basic principles of wind energy conversion- components of wind energy conversion system - site selection consideration – basic–Types of wind machines. Schemes for electric generation – generator control, load control, energy storage – applications of wind energy – Inter connected systems.

UNIT IV HYDRO ENERGY 9

Hydropower, classification of hydro power, Turbine selection, Ocean energy resources, ocean energy routes. Principles of ocean thermal energy conversion systems, ocean thermal power plants. Principles of ocean wave energy conversion and tidal energy conversion.

UNIT V OTHER SOURCES 9

Bio energy and types –Fuel cell, Geo-thermal power plants; Magneto-hydro-dynamic (MHD) energy conversion.

TOTAL: 45 HRS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Rai.G.D	Non-conventional sources of energy	Khanna publishers	2011
2	Khan.B.H	Non-Conventional Energy Resources	The McGraw Hills, Second edition	2009

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Rao.S. &Parulekar	Energy Technology	Khanna publishers, Eleventh Reprint	2013
2	Godfrey Boyl	Renewable Energy: Power sustainable future	Oxford University Press, Third edition	2012
3	John W Twidell and Anthony D Weir	Renewable Energy Resources	Taylor and Francis – 3rd edition	2015

WEBSITES

1. www.energycentral.com
2. www.catelelectricpowerinfo.com

17BEECOE01 REAL TIME EMBEDDED SYSTEMS L T P C 3 0 0 3

Course Objectives

1. To introduce students to the embedded systems, its hardware and software.
2. To introduce devices and buses used for embedded networking.
3. To study about task management
4. To learn about semaphore management and message passing
5. To study about memory management
6. To imparts knowledge on

Course Outcomes

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

1. Understand overview of embedded systems architecture
2. Acquire knowledge on embedded system, its hardware and software.
3. Gain knowledge on overview of Operating system
4. Discuss about task Management
5. Gain knowledge about semaphore management and message passing.
6. Gain knowledge about memory management.

UNIT-I INTRODUCTION TO EMBEDDED SYSTEM 9

Introduction- Embedded systems description, definition, design considerations & requirements-Overview of Embedded System Architecture (CISC and RISC)-Categories of Embedded Systems-embedded processor selection & tradeoffs- Embedded design life cycle -Product specifications-hardware / software partitioning- iterations and implementation- hardware software integration – product testing techniques–ARM7.

UNIT-II OPERATING SYSTEM OVERVIEW 9

Introduction–Advantage and Disadvantage of Using RTOS–Multitasking–Tasks-Real Time Kernels – Scheduler- Non-Preemptive Kernels – Preemptive Kernels – Reentrancy- Reentrant Functions– Round Robin Scheduling- Task Priorities- Static Priorities– Mutual Exclusion– Deadlock– Inter task Communication–Message Mailboxes–Message Queues- Interrupts- Task Management–Memory Management-Time Management–Clock Ticks.

UNIT-III TASK MANAGEMENT 9

Introduction-µ C/OS-II Features-Goals ofµ C/OS-II-Hardware and Software Architecture–Kernel Structures: Tasks–Task States–Task Scheduling–Idle Task–Statistics Task–Interrupts Under µC/OS-II –Clock Tick-µ C/OS- II Initialization. Task Management: Creating Tasks–Task Stacks–StackChecking–Task'sPriority–SuspendingTask–ResumingTask.TimeManagement: Delaying a Task–Resuming a Delayed Task–System Time. Event Control Blocks-Placing a Task in the ECB Wait List–Removing a Task from an ECB wait List.

UNIT-IV SEMAPHORE MANAGEMENT AND MESSAGE PASSING 9

Semaphore Management: Semaphore Management Overview– Signaling a Semaphore. Message Mailbox Management: Creating a Mailbox –Deleting Mailbox–Waiting for a Message box–Sending Message to a Mailbox- Status of Mailbox. Message Queue Management: Creating Message Queue–

Deleting a Message Queue–Waiting for a Message Queue–Sending Message to a Queue– Flushing a Queue.

UNIT-V MEMORY MANAGEMENT 9

Memory Management: Memory Control Blocks–Creating Partition-Obtaining a Memory Block– Returning a Memory Block. Getting Started withμ C/OS-II–Installingμ C/OS-II–Portingμ C/OS-II: Development Tools–Directories and Files– Testing a Port -IAR Workbench withμ C/OS-II-μ C/OS- II Porting on a 8051CPU– Implementation of Multitasking- Implementation of Scheduling and Rescheduling –Analyze the Multichannel ADC with help ofμ C/OS-II.

TOTAL: 45 HRS

TEXT BOOKS:

S.NO.	**Author(s) Name**	**Title of the book**	**Publisher**	**Year of publication**
1	JeanJ. Labrosse	Micro C/OS–II The Real Time Kernel	CMPBOOKS	2009
2	David Seal	ARM Architecture Reference Manual.	Addison-Wesley	2008
3	Steve Furbe,	ARM System-on-Chip Architecture,	Addison-Wesley Professional, California	2000

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	K.V.K.K.Prasad	Embedded Real-Time Systems: Concepts, Design & Programming	Dream Tech Press	2005
2	Sriram V Iyer, Pankaj Gupta	Embedded Real Time Systems Programming	Tata Mc Graw Hill	2004

17BEECOE02 CONSUMER ELECTRONICS L T P C 3 0 0 3

Course Objectives

1. To study about various speakers and microphone
2. To learn the fundamental of television systems and standards
3. To learn the process of audio recording and reproduction
4. To study various telephone networks
5. To discuss about the working of home appliances
6. To familiarize with TV services like ISDN.

Course Outcomes

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

1. Understand working of various type of loud speakers
2. Acquire knowledge on various types of picture tubes
3. Demonstrate the working of various optical recording systems
4. Distinguish various standards for color TV system
5. Acquire knowledge on various telecommunication networks
6. Demonstrate the working of various home appliances

UNIT I LOUDSPEAKERS AND MICROPHONES 9

Dynamic Loudspeaker, Electrostatic loudspeaker, Permanent Magnet Loudspeaker, Woofers and Tweeters – Microphone Characteristics, Carbon Microphones, Dynamic Microphones and Wireless Microphones.

UNIT II TELEVISION STANDARDS AND SYSTEMS 9

Components of a TV system–interlacing–composite video signal. Colour TV– Luminance and Chrominance signal; Monochrome and Colour Picture Tubes- Color TV systems– NTSC, PAL, SECAM-Components of a Remote Control.

UNIT III OPTICAL RECORDING AND REPRODUCTION 9

Audio Disc– Processing of the Audio signal–readout from the Disc –Reconstruction of the audio signal–Video Disc–Video disc formats- recording systems–Playback Systems.

UNIT IV TELECOMMUNICATION SYSTEMS 9

Telephone services-telephone networks–switching system principles–PAPX switching–Circuit, packet and message switching, LAN, MAN and WAN, Integrated Services Digital Network. Wireless Local Loop. VHF/UHF radio systems, Limited range Cordless Phones; cellular modems.

UNIT V HOME APPLIANCES 9

Basic principle and block diagram of microwave oven; washing machine hardware and software;

Components of air conditioning and refrigeration systems.

TOTAL: 45 HRS

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	S.P. Bali	Consumer Electronics	PearsonEducation	2007
2	J.S.Chitode	Consumer Electronics	Technical Publications	2007

REFERENCE:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Philip Hoff, Philip Herbert Hoff.	Consumer Electronics for Engineers.	Cambridge University Press	1998

17BEECOE03 NEURAL NETWORKS AND ITS APPLICATIONS L T P C 3 0 0 3

Course Objectives

1. To introduce the basic concepts of neural networks and its applications in various domain
2. To educate how to use Soft Computing to solve real-world problems
3. To have a solid understanding of Basic Neural Network.
4. To provide students with a sound and comprehensive understanding of artificial neural networks and machine learning.
5. To gain exposure in the field of neural networks and relate the human neural system into the digital world
6. To provide knowledge of computation and dynamical systems using neural networks

Course Outcomes

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

1. Understand the basic concepts of neural networks and its applications in various domains
2. Gain knowledge about learning process in Neural Networks
3. Apply perception concept in design
4. Design using ART phenomena
5. Gain knowledge on SOM concepts
6. Ability to develop the use of Soft Computing to solve real-world problems

UNIT I INTRODUCTION TO NEURAL NETWORKS 9

Introduction-biological neurons and their artificial models-learning, adaptation and neural network's learning rules-types of neural networks-single layer, multiple layer-feed forward, feedback networks

UNIT II LEARNING PROCESS 9

Error– correction learning– memory based learning- hebbian learning-competitive learning-Boltzmann learning-supervised and unsupervised learning-adaptation-statistical learning theory.

UNIT III PERCEPTION 9

Single layer Perception-Adaptive filtering-unconstrained Optimization-Least-mean square algorithm- Leaning Curve-Annealing Technique-perception convergence Theorem-Relationship between perception and Baye's Classifier-Back propagation algorithm

UNIT IV ATTRACT OR NEURAL NETWORK AND ART 9

Hopfield model-BAM model -BAM Stability-Adaptive BAM -Lyapunov function-effect of gain- Hopfield Design-Application to TSP problem-ART-layer 1-layer 2-orienting subsystem-ART algorithm-ARTMAP.

UNIT V SELF ORGANIZATION 9

Self-organizing map-SOM Algorithm-properties of the feature map-LVQ-Hierarchical Vector Quantization. Applications of self-organizing maps: The Neural Phonetic Type Writer Learning Ballistic Arm Movements.

TOTAL: 45 HRS

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	SimonHaykin	Neural Networks and Learning Machines	Pearson/Prentice Hall 3rd Edition	2009
2	SatishKumar	Neural Networks: A Classroom Approach	TMH	2008

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Rajasekaran.S, Vijayalakshmi Pai.G.A	Neural Networks, Fuzzy Logic and	PHI, New Delhi.	2003
2	LaureneFausett	Fundamentals of Neural Networks: Architectures, Algorithms, and Applications	Pearson/Prentice Hall	1994
3	Wasserman P.D	Neural Computing Theory & Practice	Van Nortrand Reinhold	1989
4	Freeman J.A., S kapura D.M	Neural networks, algorithms, applications, and programming techniques.	AdditionWesley	2005

17BEECOE04 FUZZY LOGIC AND ITS APPLICATIONSL T P C 3 0 0 3

Course Objectives

1. To introduce the basic concepts of Fuzzy logic and its applications in various domain
2. To educate how to use Fuzzy computation to solve real-world problems
3. To have a solid understanding of Basic fuzzy models.
4. Provide an understanding of the basic mathematical elements of the theory of fuzzy sets.
5. To learn about applications on Fuzzy based systems
6. To familiarize with fuzzy fiction and de fuzzy fiction procedures

Course Outcomes

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

1. Understand the basic concepts of Fuzzy logic and its applications in various domain
2. Gain knowledge on theory of Reasoning
3. Develop fuzzy controllers
4. Understand concepts of adaptive fuzzy control
5. Ability to develop how to use Fuzzy computation to solve real- world problems
6. Design fuzzy based model for any application

UNIT-I **9**

Basics of Fuzzy Logic: Fuzzy sets, Properties of fuzzy sets, operation in fuzzy sets, fuzzy relations, the extension principle

UNIT–II **9**

Theory of Approximate Reasoning: Linguistic variables, Fuzzy proportions, Fuzzy if-then statements, inference rules, compositional rule of inference-fuzzy models

UNIT-III
9

Fuzzy Knowledge Based Controllers (Fkbc): Basic concept structure of FKBC, choice of membership functions, scaling factors, rules, fuzzy fiction and de fuzzy fiction procedures– Design of Fuzzy

Logic Controller

UNIT-IV **9**

Adaptive Fuzzy Control: Process performance monitoring, adaption mechanisms, membership functions, tuning using gradient descent and performance criteria. Set organizing controller model based controller.

UNIT V **9**

Fuzzy based systems: Simple applications of FKBC-washing machines-traffic regulations-lift control-fuzzy in medical Applications-Introduction to ANFIS.

TOTAL: 45 HRS

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	D .Diankar ,H. Hellendoom and M .Rein frank	An Introduction to Fuzzy Control	Narosa Publishers India	1996
2	G.J. KlirandT.A. Folger	Fuzzy Sets Uncertainty and Information	PHI IEEE	1995

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Timothy J. Ross	Fuzzy Logic with Engineering Applications	McGraw Hill	1997
2	George. J Klir and Bo Yuan	Fuzzy Sets and Fuzzy Logic	Prentice Hall, USA	1995

17BTBTOE01 BIOREACTOR DESIGN 3003100

Course Objectives:

1. To impart basic knowledge in bioprocess Engineering
2. To design the bioreactors for various operations.
3. To understand the principle and working of heat transfer equipments.
4. To extend the knowledge in principle of heat transfer inside a bioreactor
5. To construct the equipments used in mass transfer operations.
6. To learn the equipments used in separation process.

Course Outcomes:

1. Summarize the basic concepts in bioprocess Engineering.
2. Design the bioreactors for various operations.
3. Develop the heat transfer equipments for Bioprocess Engineering.
4. Elaborate the principle of heat transfer in bioreactor.
5. Construct the equipments used in mass transfer operations.
6. Categorize the equipments used in separation process.

UNITI ENGINEERING PROPERTIES AND STORAGE TANK (9)

Introduction to various mechanical properties of material to be used material of construction, design of cylindrical storage tank.

UNITII REACTOR DESIGN (9)

Design of Airlift fermentor,Bubble column reactor and Continuous stirred tank reactor.

UNITIII HEAT TRANSFER EQUIPMENTS (9)

Design of Shell and tube Heat exchanger, Double pipe heat exchanger, long tube vertical evaporator and forced circulation evaporator.

UNITIV MASS TRANSFER EQUIPMENTS (9)

Design of Bollmann extractor, fractionating column, packed tower and spray tray absorber

UNITV SEPARATION EQUIPMENTS (9)

Design of plate and frame filter press, leaf filter, rotary drum filter, disc bowl centrifuge,rotary drum drier and Swenson–walker crystallizer. **TOTAL: 45 HRS**

TEXTBOOKS:

S.No	Author(s)Name	Title of the book	Publisher	Year of Publications
1	James Edwin Bailey, DavidF.Ollis	Biochemical Engineering Fundamentals	McGraw-Hill	2007
2	DonW.Green,RobertH. Perry	Chemical Engineer Handbook	The McGraw- Hill	2008

REFERENCEBOOKS

S.No	Author(s)Name	Title of the book	Publisher	Year of Publications
1	Pauline.M.Doran	Bioprocess Engineering Principles	Academic Press	2013

17BTBTOE02 FOODPROCESSINGANDPRESERVATION 3003100

Course Objectives

1. To learn the scope and importance of food processing.
2. To impart basic knowledge in different food processing methods carried out in the food tech companies.
3. To extend the brief knowledge in food conservation operations.
4. To study the methods of food preservation by cooling.
5. To familiarize the students on the concepts of preservation methods for fruits.
6. To create deeper understanding on preservation methods for vegetables.

Course Outcomes

1. Describe the scope and importance of food processing.
2. Outline the various processing methods for foods.
3. Extend the knowledge in food conservation operations.
4. Describe the methods of food preservation by cooling.
5. Summarize the preservation methods for fruits.
6. Demonstrate the preservation methods for vegetables.

UNITI SCOPEANDIMPORTANCEOFFOODPROCESSING (9)

Properties of food- Physical, thermal, mechanical, sensory. Raw material Preparation - Cleaning,sorting,grading,peeling.

UNITII PROCESSINGMETHODS (9)

Heating- Blanching and Pasteurization. Freezing- Dehydration- canning- additives- fermentation- extrusioncooking- hydrostatic pressure cooking- dielectric heating- microwave processingandasepticprocessing–Infraredradiationprocessing- Conceptsandequipmentused.

UNITIII FOODCONVERSIONOPERATIONS (9)

Size reduction- Fibrous foods, dry foods and liquid foods- Theory and equipments- membrane separation-filtration-equipmentandapplication.

UNITIV FOODPRESERVATIONBYCOOLING (9)

Refrigeration, Freezing-Theory, freezing time calculation, methods of freezing, freezing equipments, freeze drying, freeze concentration, thawing, effect oflowtemperatureonfood. Water activity, methods tocontrolwateractivity.

UNITV PRESERVATIONMETHODSFORFRUITSANDVEGETABLES (9)

Preprocessing operations-preservation by reduction of water content: drying/dehydration and concentration –chemical preservation –preservation of vegetables by acidification, preservation withsugar-Heatpreservation–Foodirradiation-Combinedpreservationtechniques.

TOTAL: 45 HRS

TEXTBOOKS

S.No	Author(s)Name	Titleofthebook	Publisher	Year of Publications
1	R.PaulSingh,DennisR. Heldman	Introduction to food engineering.	Academic Press	2001
2	P.Fellows.	Food Processing Technology, Principles and practice.	Woodhead Publishing Ltd	2000
3	MirceaEnachescuDauthy	Fruit and Vegetable Processing	FAO agricultural services bulletin	1995

REFERENCEBOOKS

S.No	Author(s)Name	Titleofthebook	Publisher	Year of Publications
1	M.A. Rao, SyedS.H. Rizvi,AshimK.Datta	Engineering properties offoods	CRC Press	2005
2	B.Sivasankar	Food processingand preservation	PHI Learning Pvt.Ltd	2002

17BTBTOE03 BASICBIOINFORMATICS 3003100

Course Objectives

1. To understand the available tools and databases for performing research in bioinformatics.
2. To expose students to sequence alignment tool in bioinformatics.
3. To construct the phylogenetic trees for evolution.
4. To get familiar with the 3D structure of protein and classification.
5. To acquire basic knowledge in protein secondary structure prediction.
6. To extend the brief knowledge in Micro array data analysis.

Course Outcomes

1. Summarize the basic concepts and importance of Bioinformatics in various sectors.
2. Demonstrate the sequence alignment tool in bioinformatics.
3. Construct the phylogenetic trees for evolution.
4. Analyze the three dimensional protein structure and classification using various tools.
5. Illustrate the protein secondary structure prediction by comparative modeling.
6. Extend the knowledge in micro array technology and applications of bioinformatics in various sectors.

UNIT I OVERVIEW OF BIOINFORMATICS (9)

The scope of bioinformatics; bioinformatics & the internet; useful bioinformatics sites. Data acquisition: sequencing DNA, RNA & proteins; determination of protein structure; gene & protein expression data; protein interaction data. Databases–contents, structure & annotation: file formats; annotated sequence databases; miscellaneous databases.

UNIT II RETRIEVAL OF BIOLOGICAL DATA (9)

Data retrieval with Entrez & DBGET/ LinkDB; data retrieval with SRS(sequence retrieval system). Searching sequence databases by sequence similarity criteria: sequence similarity searches; amino acid substitution matrices; database searches, FASTA & BLAST; sequence filters; iterative database searches & PSI-BLAST. Multiple-sequence alignment, gene &protein families: multiple-sequence alignment & family relationships; protein families & pattern databases; protein domain families.

UNIT III PHYLOGENETICS (9)

Phylogenetics, cladistics &ontology; building phylogenetic trees; evolution of macromolecularsequences.Sequenceannotation:principlesofgenomeannotation;annotationtools &resources.

UNIT IV STRUCTURAL BIOINFORMATICS (9)

Conceptual models of protein structure ; the relationship of protein three-dimensional structure to protein function; the evolution of protein structure & function; obtaining, viewing & analyzing structural data; structural alignment; classification of proteins of known three-dimensional structure:

CATH & SCOP ; introduction to protein structure prediction; structure prediction by comparative remodeling; secondary structure prediction; advanced protein structure prediction & prediction strategies.

UNITV MICRO ARRAY DATA ANALYSIS (9)

Microarray data, analysis methods; micro array data, tools & resources ;sequence sampling & SAGE. Bioinformatics in pharmaceutical industry: informatics & drug discovery; pharma informatics resources. Basic principles of computing in bioinformatics: running computer software; computer operating systems; software downloading & installation; database management.

TOTAL: 45 HRS

TEXTBOOK

S.No.	Author (s) Name	Titleofthebook	Publisher	Year of Publication
1	Dan E. Krane, Micha L.Rayme	Fundamental Concepts of Bioinformatics	Pearsoneducation	2004
2	Andreas D. Baxevanis, B. F. Francis Ouellette	Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins	Wiley-Interscience	2004
3	David W. Mount	Sequence and Genome Analysis	ColdSpringHarbor Laboratory	2004
4	Jonathan Pevsner	Bioinformatics andFunctional Genomics	Wiley-Liss	2003

REFERENCEBOOKS

S.No.	Author (s) Name	Titleofthebook	Publisher	Year of Publication
1	Michael J. Korenberg	Microarray Data Analysis: MethodsandApplications	Springer Science & BusinessMedia	2007

17BTBTOE04 FUNDAMENTALS O F NANO BIOTECHNOLOGY 3003100

Course Objectives

1. To impart the skills in the field of nano biotechnology and its applications.
2. To acquire knowledge in the nano particles and its significance in various fields.
3. To extend the knowledge in types and application of nano particles in sensors.
4. To define the concepts of biomaterials through molecular self assembly.
5. To equip students with clinical applications of nano devices.
6. To describe deeper understanding of the socio-economic issues in nanobiotechnology.

Course Outcomes

1. Develop skills in the field of nano biotechnology and its applications.
2. Summarize the nanoparticles and its significance in various fields.
3. Extend the knowledge in types and application of nano particles in sensors.
4. Define the concepts of biomaterials through molecular self assembly.
5. Outline the clinical applications of nano devices.
6. Describe the socio-economic issues in nanobiotechnology.

UNIT I INTRODUCTION 9

Introduction, Scope and Overview, Length scales , Importance of Nanoscale and Technology, History of Nanotechnology, Future of Nanotechnology: Nano Technology Revolution, Silicon based Technology, Benefits and challenges in Molecular manufacturing: The Molecular assembler concept, Controversies and confusions, Understanding advanced capabilities, Nanotechnology in Different, Fields: Nanobiotechnology, Materials, Medicine, Dental care.

UNIT II NANO PARTICLES 9

Introduction, Types of Nanoparticles, Techniques to Synthesize Nanoparticles, Characterization of Nanoparticles, Applications, Toxic effects of Nanomaterials, Significance of Nanoparticles Nanofabrications- MEMS/NEMS, Atomic Force Microscopy, Self assembled monolayers/ Dip- pen Nanolithography, Soft Lithography, PDMS Molding, Nano Particles, Nano wires and Nanotubes.

UNIT III APPLICATIONS 9

Nanomedicine, Nanobiocensor and Nanofludics.Nanocrystals in biological detection, Electrochemical DNA sensors and Integrated Nanoliter systems.Nano-Biodevices and Systems.Fabrication of Novel Biomaterials through molecular self assembly- Small scale systems for in vivo drug delivery- Future nanomachine.

UNIT IV NANOBIOTECHNOLOGY 9

Clinical applications of nanodevices.Artificial neurons.Real-time nanosensors- Applications in cancer biology.Nanomedicine.Synthetic retinyl chips based on bacteriorhodopsins.High throughput DNA sequencing with nanocarbon tubules.Nanosurgical devices.

UNIT V ETHICAL ISSUES IN NANOTECHNOLOGY 9

Introduction, Socioeconomic Challenges, Ethical Issues in Nanotechnology: With Especial Reference to Nanomedicine, Nanomedicine Applied in Nonmedical Contexts, Social Issues Relating to Nanomedicine. Social and Ethical Issues, Economic Impacts, Other Issues, Nanotechnology and Future Socio-economic challenges.

TOTAL: 45 HRS

TEXTBOOKS

S.No.	Author(s) Name	Titleofthebook	Publisher	Yearof Publications
1	Niemeyer,C.M. andMirkin,C.A	Nanobiotechnology:Concepts, Applicationsand Perspectives	Wiley-VCH	2004
2	Goodsell,D.S.	Bionanotechnology	JohnWiley andSons, Inc	2004

REFERENCEBOOKS

S.No.	Author(s) Name	Titleofthebook	Publisher	Yearof Publications
1	Shoseyov,O. and Levy,I	Nanobiotechnology: BioinspiredDevicesand MaterialsoftheFuture	Humana Press	2007
2	Bhushan,B.	SpringerHandbookof Nanotechnology	Springer-Verlag Berlin Heidelberg	2004
3	FreitasJrR.A	Nanomedicine	Landes Biosciences	2004
4	Kohler,M.and Fritzsche,W.	Nanotechnology–An IntroductiontoNanostructuring Techniques	Wiley-VCH	2004

17BEMEOE01 COMPUTER AIDED DESIGN 3 0 0 3 100

Course Objective

1. To apply basic concepts to develop construction (drawing) techniques.
2. To ability to manipulate drawings through editing and plotting techniques.
3. To understand geometric construction and Produce template drawings.
4. To understand and demonstrate dimensioning concepts and techniques.
5. To understand Section and Auxiliary Views.
6. To become familiar with Solid Modelling concepts and techniques.

Course Outcome

1. Apply basic concepts to develop construction (drawing) techniques.
2. Ability to manipulate drawings through editing and plotting techniques.
3. Understand geometric construction and Produce template drawings.
4. Understand and demonstrate dimensioning concepts and techniques
5. Understand Section and Auxiliary Views
6. Become familiar with Solid Modelling concepts and techniques.

UNIT I OVERVIEW OF CAD SYSTEMS 9

Conventional and computer aided design processes-advantages and disadvantages. Subsystems of CAD-CAD hardware and software, analytical and graphics packages, CAD workstations. Networking of CAD systems.

UNIT II INTERACTIVE COMPUTER GRAPHICS AND GRAPHICS TRANSFORMATIONS 9

Generative, cognitive and image processing graphics. Static and dynamic data graphics. Transport of graphics data. Graphic standards. Generation of graphic primitives - display transformation in Two- and Three – Dimensional graphics concepts, Graphical input technique, Geometric transpformations, Visual Realism, Computer animation, customizing graphics software.

UNIT III GEOMETRIC MODELING 9

Wireframe, surface, NURBS and solid modeling-applications and advantages. Creating primitive solids, sweeping solids, boolean operations. Extracting entities from a solid. Filleting of edges of solids. Boundary representation (B-rep) Constructive Solid Geometry(CSG) and Analytical Solid Modeling(ASM)

UNIT IV PARAMETRIC DESIGN AND OBJECT REPRESENTATION 9

Types of co-ordinate systems. Parametric design - definition and advantages. Parametric representation of analytic and synthetic curves. Parametric representation of surfaces and solids - manipulations.

UNIT V PRODUCT DESIGN AND DEVELOPMENT 9

Automated 2D drafting - basics, mechanical assembly - bill of materials generation. Mass property calculations.

TOTAL 45 HRS

TEXT BOOKS

S. No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Vera B Anand	Computer Graphics and Geometric Modeling for Engineers	John Wiley & Sons, New York	2000
2	Radhakrishnan P and Subramanyan S	CAD/CAM/CIM	New Age International Pvt. Ltd	2004

REFERENCES

S. No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Radhakrishnan P and Kothandaraman C P	Computer Graphics and Design	Dhanpat Rai & Sons, New Delhi	2002
2	Ibrahim Zeid	CAD/CAM Theory and Practice	McGraw Hill Inc., New York	2003
3	Barry Hawhes	The CAD/CAM Process	Pitman Publishing, London	1998
4	William M Newman and Robert Sproul	Principles of Interactive Computer Graphics	McGraw Hill Inc., New York	1994
5	Sadhu Singh	Computer-Aided Design and Manufacturing	Khanna Publishers, New Delhi	1998
6	Rao S S	Optimisaiton Techniques	Wiley Eastern, New Delhi	2003

17BEMEOE02 INDUSTRIAL SAFETY AND ENVIRONMENT 3 0 0 3 100

COURSE OBJECTIVE

1. To recognize and evaluate occupational safety and health hazards in the workplace.
2. To determine appropriate hazard controls following the hierarchy of controls.
3. To analyse the effects of workplace exposures, injuries and illnesses, fatalities.
4. To prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.
5. To teach student the concept of Industrial Safety & provide useful practical knowledge for workplace safety.
6. To prevent or mitigate harm or damage to people, property, or the environment.

COURSE OUTCOME

1. Recognize and evaluate occupational safety and health hazards in the workplace.
2. Determine appropriate hazard controls following the hierarchy of controls.
3. Analyse the effects of workplace exposures, injuries and illnesses, fatalities.
4. Prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.
5. Understand the concept of Industrial Safety & provide useful practical knowledge for workplace safety.
6. Prevent or mitigate harm or damage to people, property, or the environment.

UNIT I INTRODUCTION TO LOGISTICS 9

Logistics - concepts, definitions and approaches, factors influencing logistics - Supply chain: basic tasks, definitions and approaches, influencing supply chain - a new corporate model.

UNIT II PHASES OF SUPPLY CHAIN 9

The new paradigm shift - The modular company - The network relations - Supply processes - Procurement processes - Distribution management.

UNIT III EVOLUTION OF SUPPLY CHAIN MODELS 9

Strategy and structure - Factors of supply chain - Manufacturing strategy stages - Supply chain progress - Model for competing through supply chain management - PLC grid, supply chain redesign - Linking supply chain with customer.

UNIT IV SUPPLY CHAIN ACTIVITIES 9

Structuring the SC, SC and new products, functional roles in SC - SC design frame- work - Collaborative product commerce (CPC).

UNIT V SCM ORGANISATION AND INFORMATION SYSTEM 9

The management task - Logistics organization - The logistics information systems - Topology of SC application - Product Data Management - Warehouse management system MRP- I, MRP - II, ERP,. - Case study, ERP Software's

TOTAL 45 HRS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Shari.P.B and Lassen.T.S	Managing the global supply chain	Viva books, New Delhi	2000
2	Ayers.J.B	Hand book of supply chain management	The St. Lencie press	2000

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Nicolas.J.N	Competitive manufacturing management - continuous improvement, Lean production, customer focused quality	McGrawHill, New York	1998
2	Steudel.H.J and Desruelle.P	Manufacturing in the nineteen - How to become a mean, lean and world class competitor	Van No strand Reinhold, New York	1992

COURSE OBJECTIVE

1. To generalized equations for mass, momentum and heat.
2. To understand the concepts of Reynolds and Gauss theorems.
3. To learn combined diffusive and convective transport.
4. To apply Film- and penetration models for mass and heat transfer.
5. To apply Stefan-Maxwells equations for multi-component diffusion.
6. To Solve the given set of equations either analytically or numerically.

COURSE OUTCOME

1. Generalized equations for mass, momentum and heat.
2. Understand the concepts of Reynolds and Gauss theorems.
3. Learn combined diffusive and convective transport.
4. Apply Film- and penetration models for mass and heat transfer.
5. Apply Stefan-Maxwells equations for multi-component diffusion.
6. Solve the given set of equations either analytically or numerically.

UNIT I INTRODUCTION AND BASIC CONCEPTS 9

General overview of transport phenomena including various applications, Transport of momentum, heat and mass , Transport mechanism, Level of transport, Driving forces, Molecular transport (diffusion), convective transport (microscopic)

UNIT II PROPERTIES, UNITS AND OTHER PHYSICAL PARAMETERS 9

Unit systems, temperature, mole, concentration, pressure, Gas laws, laws of conservation, energy and heat units

UNIT III MOMENTUM TRANSPORT 9

Basic concepts in fluid mechanics, Force, unit and dimensions, pressure in fluid, head of fluid, Molecular transport for momentum, heat and mass transfer, Viscosity of fluids, Newton's law, Momentum transfer, Newtonian and non- Newtonian fluids, Fluid flow and Reynolds number, Overall mass balance, Control volume and Continuity equation, Overall energy balance, Bernoulli's equation, Overall momentum balance, Drag coefficient, Stokes law, Flow in packed beds, Flow in fluidized bed

UNIT IV ENERGY TRANSPORT 9

Basic concepts in heat transfer, Heat transfer mechanisms, Fourier's law of heat conduction, thermal conductivity, convective heat transfer coefficient, Conduction heat transfer - through flat slab/wall and through hollow cylinder, Conduction through solids in series, Forced convection heat transfer inside pipes, Heat transfer outside various geometrics in forced convection, General discussion on natural convection heat transfer, Heat exchangers, General discussion on radiation heat transfer

UNIT V MASS TRANSPORT 9

Basic concepts in mass transport, Some application examples, Modes of mass transfer, Molecular diffusion- Fick's law, Analogy between mass, heat and momentum transfer, Dispersion, Hydraulic or Darcy's flow in porous media, Chemical kinetics and activation energy, Film theory, Convective mass

transfer, Liquid-solid mass transfer, Liquid-liquid mass transport, Gas-liquid mass transfer, Aeration and oxygen transport, Air stripping

TOTAL 45 HRS

REFERENCE

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Geankoplis, C. J	Transport Processes and Separation Processes Principles	Prentice Hall	2003

WEB REFERENCE

1. https://laulima.hawaii.edu/portal

COURSE OBJECTIVE

1. To describe the principles of the study of human movement.
2. To describe the range of factors that influence the initiation, production and control of human movement.
3. To identify the body's lever systems and their relationship to basic joint movement and classification.
4. To distinguish between biomechanical principles of kinetics and kinematics when applied to the analysis of human movement.
5. To explain joint and muscle function and the forces acting upon the human body during various sporting activities.
6. To relate the different body systems necessary for human movement to occur.

COURSE OUTCOME

1. Describe the principles of the study of human movement.
2. Describe the range of factors that influence the initiation, production and control of human movement.
3. Identify the body's lever systems and their relationship to basic joint movement and classification.
4. Distinguish between biomechanical principles of kinetics and kinematics when applied to the analysis of human movement.
5. Explain joint and muscle function and the forces acting upon the human body during various sporting activities.
6. Relate the different body systems necessary for human movement to occur.

UNIT I INTRODUCTION 9

Biomechanics - Improving Performance – Applications - Preventing And Treating Injury - Qualitative And Quantitative Analysis - Scholarly Societies - Computer Searches – Biomechanical Knowledge versus Information - Kinds of Sources - Evaluating Sources

UNIT II KEY MECHANICAL CONCEPTS 9

Mechanics - Basic Units - Nine Fundamentals of Biomechanics - Principles and Laws - Nine Principles for Application ofBiomechanics

UNIT III HUMAN ANATOMY AND SOME BASIC TERMINOLOGY 9

Gross (Whole-Body) Modeling - Position and Direction Terminology - Terminology for Common Movements - Skeletal Anatomy - Major Joints - Major Muscle Groups - Anthropometric Data

UNIT IV ANATOMICAL DESCRIPTION 9

Key Anatomical Concepts - Directional Terms - Joint Motions - Muscle Actions - Active and Passive Tension of Muscle - Limitations of Functional Anatomical Analysis - Mechanical Method of Muscle

Action Analysis - The Need for Biomechanics to Understand Muscle Actions - Sports Medicine and Rehabilitation Applications

UNIT V MECHANICS OF THE MUSCULOSKELETAL SYSTEM 9

Tissue Loads - Response of Tissues To Forces - Biomechanics of The Passive Muscle–Tendon Unit - Biomechanics of Bone - Biomechanics of Ligaments - Three Mechanical Characteristics of Muscle - Stretch-Shortening Cycle (SSC) - Force–Time Principle - Neuromuscular Control

TOTAL 45 HRS

REFERENCE

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Duane Knudson	Fundamentals of Biomechanics	Springer Science+ Business Media, LLC	2007
2	C. Ross Ethier Craig A. Simmons	Introductory Biomechanics	Cambridge University Press	2007

17BEAEOE01 AUTOMOBILE ENGINEERING 3 0 0 3 100

Course Objectives

- To impart the knowledge on constructional details and principle of operation of various automobile components.
- To learn the function and working of various components in transmission and drive lines.
- To study the concept and working of steering and suspension systems in an automobile.
- To give the knowledge on wheels, tyres and brakes of automobiles.
- To provide the information on current and future trends in automobiles.
- Identify and explain the types of steering system.

Course Outcomes

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

- Demonstrate the operating principles and constructional details of various automobile components.
- Explain the function and working of components in transmission and drive lines.
- Identify and explain the types of steering system.
- Identify and explain the types of suspension system.
- Classify and describe the types of wheels, tyres and brakes of automobiles.
- Discuss the current and future trends in the automobiles.

UNIT-I ENGINE AND FUEL FEED SYSTEMS 9

Classification of Engine , construction and working of four stroke petrol and diesel engine, firing order and its significance. Carburettor working principle, requirements of an automotive carburettor, Petrol injection Systems (MPFI, TBI), Diesel fuel injection systems (CRDI)

UNIT –II TRANSMISSION SYSTEMS 9

Requirements of transmission system.Flywheel. Different types of clutches, principle, Construction, torque capacity and design aspects. Objective of the gearbox - Determination of gear ratios for vehicles. Performance characteristics at different speeds. Different types of gearboxes - operation. Function of Propellar Shaft Construction details of multi drive axle vehicles. Different types of final drive. Differential principles. Constructional details of differential unit. Non-slip differential. Differential lock

UNIT -III SUSPENSION SYSTEM 9

Need of suspension system - Types of suspension - Suspension springs - Constructional details and characteristics of leaf, coil and torsion bar springs - Independent suspension - Rubber suspension – Pneumatic suspension – Hydro Elastic suspension - Shock absorbers. Vibration and driving comfort.

UNIT-IV BRAKES 9

Necessity of brake, stopping distance and time, brake efficiency, weight transfer, shoe brake and disc brake theoryBrake actuating systems - Mechanical, Hydraulic and Pneumatic. Parking and engine exhaust brakes. Power and power assisted brakes. Antilock Braking System (ABS).

UNIT -V ELECTRICAL SYSTEM 9

Principle and construction of lead acid battery.Lighting system: details of head light and side light, LED lighting system, head light dazzling and preventive methods – Horn, wiper system and trafficator.Starting System and charging system.

TOTAL 45 HRS

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Young U.P and Griffiths L	Automotive Electrical Equipment	ELBS & New Press	1999
2.	Ganesan.V	Internal Combustion Engines	Tata McGraw-Hill Publishing Co., New Delhi	2003
3.	Dr.Kirpal Singh	Automobile Engineering	Standard Publishes	2011

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Heldt .P.M	The Automotive Chassis	Literary Licensing,LLC	2012
2.	Crouse.W.H	Automobile Electrical Equipment", 3rd Edition	McGraw-Hill Book Co., Inc., New York.	1986

3.	N.Newton, W. Steeds and T.K.Garrett	The Motor vehicle, 13th edition	SAE Inc	2001

17BEAEOE02 BASICS OF TWO AND THREE WHEELERS 3 0 0 3 100

Course Objectives

1. The objective of this course is to make the students to know and understand the constructional details, operating characteristics and design aspects of Two and Three wheelers.
2. Construct the frames of two and three wheelers of different layouts.
3. Demonstrate the constructional details and principle of operation of various engine components.
4. Identify and explain the types of transmission systems.
5. Identify and explain the types of steering and suspension systems.
6. Classify and describe the types of wheels, tyres and brakes for two and three wheelers.

Course Outcomes

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

1. Construct the frames of two and three wheelers of different layouts.
2. Demonstrate the constructional details and principle of operation of various engine components.
3. Identify and explain the types of transmission systems.
4. Identify and explain the types of steering and suspension systems.
5. Classify and describe the types of wheels, tyres and brakes for two and three wheelers.
6. Explain the servicing of two and three wheelers.

UNIT I INTRODUCTION 9

Classifications- design considerations –weight and dimension limitations – requirements stability problems, gyroscopic effect- pendulum effect of two and three wheelers.

UNIT II POWER UNITS, IGNITION SYSTEMS AND OTHER ELECTRICAL SYSTEMS 9

2 stoke and 4 stoke SI engines and CI engines design criteria– design of cylinders, cylinder head, cooling fins, crank case, connecting rod and crank shaft. Carburettor types and design. Battery coil ignition, magneto ignition and electronic ignition. Lighting and other electrical system.

UNIT III CLUTCHES AND TRANSMISSION 9

Types of clutches for 2 and 3 wheelers. Design of clutch system. Gears for two and three wheelers. Design of gear box and gear change mechanism. Belt, chain and shaft drive. Freewheeling devices, starting systems.

UNIT IV FRAMES, SUSPENSION, WHEELS AND TYRES 9

Types of frames used for two wheelers and three wheelers. Wheel frames- construction design of frames for fatigue strength torsional stiffness and lateral stability. Front and rear forks. Springs for suspension, Dampers, constructional details of wheel and tyres.

UNIT V THREE WHEELERS 9

Auto rickshaws, different types, Pick-Ups and delivery type vehicle, frames and transmission for 3 wheelers wheel types, wheel attachment tyre types. Brakes and their operating mechanism.

TOTAL 45 HRS

TEXT BOOKS:

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Irving P.E.	Motor Cycle Engineering.	Temple Press Book, London.	1992.
2.	Srinivasan.S.	Motor cycle, Scooter, Mobeds.	New century book house.	1988.

REFERENCES:

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	M.M.Griffin.	Motor cycles from inside and outside.	Prentice Hall Inc, New Jersey.	1978.
2.	Bruce A. Johns, David D.Edmundson and	Motorcycles: Fundamentals, Service, Repair	Goodheart-Willcox	1999

	Robert Scharff			

17BEAEOE03 AUTOMOBILE MAINTENANCE 3 0 0 3 100

Course Objectives

1. The objective of this course is to make the students to know and understand the maintenance and fault diagnosis of basic systems inAutomobile.
2. Describe and differentiate the types of maintenance.
3. List the procedure for dismantling, servicing and assembling of engine components.
4. Demonstrate the servicing of transmission and driveline components.
5. Discuss the procedure for steering and suspension
6. Discuss the procedure for wheel and brake maintenance.

Course Outcomes

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

1. Describe and differentiate the types of maintenance.
2. List the procedure for dismantling, servicing and assembling of engine components.
3. Demonstrate the servicing of transmission and driveline components.
4. Discuss the procedure for steering and suspension
5. Discuss the procedure for wheel and brake maintenance.
6. Explain the fault diagnosis in the electrical and air conditioner systems.

UNIT I MAINTENANCE OF RECORDS AND SCHEDULES 9

Importance of maintenance, preventive (scheduled) and breakdown (unscheduled) maintenance, requirements of maintenance, preparation of check lists, Inspection schedule, maintenance of records, log sheets and other forms, safety precautions in maintenance.

UNIT II ENGINE MAINTENANCE 9

Dismantling of engine components and cleaning, cleaning methods, visual anddimensional inspections, minor and major reconditioning of various components, reconditioning methods, engine assembly, special tools used for maintenance overhauling, engine tune up.

UNIT III CHASSIS MAINTENANCE 9

Mechanical and automobile clutch and gear box, servicing and maintenance, maintenance servicing of propeller shaft and differential system, Maintenance servicing of suspension systems. Brake systems, types and servicing techniques, Steering systems, overhauling and maintenance. Wheel alignment, computerized alignment and wheel balancing.

UNIT IV ELECTRICAL SYSTEM MAINTENANCE 9

Testing methods for checking electrical components, checking battery, starter motor, charging systems, DC generator and alternator, ignitions system, lighting systems, Fault diagnosis and maintenance of modern electronic controls, checking and servicing of dash board instruments.

UNIT V MAINTENANCE OF FUEL SYSTEM, COOLING SYSTEMS, LUBRICATION SYSTEM AND VEHICLE BODY 9

Servicing and maintenance of fuel system of different types of vehicles, calibration and tuning of engine for optimum fuel supply, Cooling systems, water pump, radiator, thermostat, anticorrosion and antifreeze additives, Lubrication maintenance, lubricating oil changing, greasing of parts, Vehicle body maintenance, minor and major repairs. Door locks and window glass actuating system maintenance.

TOTAL 45 HRS

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	John Doke	Fleet Management	McGraw Hill Co	1984
2.	James D Halderman	Advanced Engine Performance Diagnosis	Prentice Hall Publications	2011
3.	Service Manuals from Different Vehicle Manufacturers			

17BEAEOE04 INTRODUCTION TO MODERN VEHICLE TECHNOLOGY 3 0 0 3 100

Course Objectives:

1. To impart knowledge on trends in the vehicle power plants.
2. To learn the various advanced driver assistance systems.
3. To study the working of advanced suspension and braking systems in an automobile.
4. To give information about motor vehicle emission and noise pollution control.
5. To provide knowledge of the vehicle telematics.
6. To give information about the noise control techniques

Course Outcomes:

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

1. Distinguish and describe the various modern vehicle power plant systems.
2. List and explain the various driver assistant mechanisms.
3. Identify and describe the working of advanced suspension and braking systems.
4. Apply the knowledge of motor vehicle emission and noise pollution control.
5. Describe the noise control techniques
6. Describe the vehicle telematics and its applications.

UNIT I TRENDS IN POWER PLANTS 9

Hybrid vehicles - Stratified charged / learn burn engines - Hydrogen engines - battery vehicles – Electric propulsion with cables - Magnetic track vehicles.

UNIT II DRIVER ASSISTANCE SYSTEMS 9

Collision Avoidance Systems, Adaptive cruise control, adaptive noise control, anti spin regulation, traction control systems, cylinder cut- off technology, ABS, Driver Drowsiness Detection system

UNIT III SUSPENSION BRAKES AND SAFETY 9

Air suspension - Closed loop suspension - antiskid braking system, Retarders, Regenerative braking safety cage - air bags - crash resistance - passenger comfort.

UNIT IV NOISE & POLLUTION 9

Reduction of noise - Internal & external pollution control through alternate fuels/power plants – Catalytic converters and filters for particulate emission.

UNIT VTELEMATICS 9

Global positioning systems, geographical information systems, navigation systems, automotive vision system, road recognition

TOTAL 45 HRS

TEXT BOOKS

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	LjuboVlacic, Michael Saren and Fumio Harashima	Intelligent Vehicle Technologies	Butterworth-Heinemann publications, Oxford	2001
2.	Ronald K.Jurgen	Navigation and Intelligent Transportation Systems –Progress in Technology	Automotive Electronics Series,SAE, USA.	1998

REFERENCES

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	William B Riddens	"Understanding Automotive Electronics", 5th Edition	Butterworth Heinemann Woburn.	1998
2.	Bechhold,	"Understanding Automotive Electronics"	SAE	1998
3.	Robert Bosch,	"Automotive HandBook", 5th Edition	SAE	2000

17BECEOE01 HOUSING, PLAN AND MANAGEMENT 3 0 0 3 100

COURSE OBJECTIVES

1. To examine the role and tasks of basic housing policies and building bye laws
2. Understand the process of integrated service delivery in the context of economic, social, environmental and institutional factors
3. Analyze the Innovative construction methods and Materials
4. Analyze city management strategies and strengthen the urban governance through a problem solving approach
5. To know the Importance of basic housing policies and building bye laws
6. To use Housing Programmes and Schemes

COURSE OUTCOME

The students will be able to

1. Know the Importance of basic housing policies and building bye laws
2. Use Housing Programmes and Schemes
3. Plan and Design of Housing projects
4. Examine Innovative construction methods and Materials
5. Know Housing finance and loan approval procedures
6. Understand Construction as well as managing techniques

UNIT I INTRODUCTION TO HOUSING 9

Definition of Basic Terms – House, Home, Household, Apartments, Multi storeyed Buildings, Special Buildings, Objectives and Strategies of National Housing Policies, Principle of Sustainable Housing, Housing Laws at State level, Bye-laws at Urban and Rural Local Bodies – levels - Development Control Regulations, Institutions for Housing at National, State and Local levels

UNIT II HOUSING PROGRAMMES 9

Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighbourhoods, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programmes, Role of Public, Private and Non-Government Organisations.

UNIT III PLANNING AND DESIGN OF HOUSING PROJECTS 9

Formulation of Housing Projects – Site Analysis, Layout Design, Design of Housing Units (Design Problems)

UNIT IV CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS 9

New Constructions Techniques – Cost Effective Modern Construction Materials, Building Centers – Concept, Functions and Performance Evaluation

UNIT V HOUSING FINANCE AND PROJECT APPRAISAL 9

Appraisal of Housing Projects – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy, Pricing o f Housing Units, Rents, Recovery Pattern (Problems).

TOTAL : 45 HRS

TEXT BOOKS

1. Meera Mehta and Dinesh Mehta, Metropolitan Housing Markets, Sage Publications Pvt. Ltd., New Delhi, 2002.
2. Francis Cherunilam and Odeyar D Heggade, Housing in India, Himalaya Publishing House, Bombay, 2001.

REFERENCES

1. Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 2002.
2. UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS (Habitat), Nairobi, 2000.

17BECEOE02 BUILDING SERVICES 3 0 0 3 100

COURSE OBJECTIVES

1. Defining and identifying of eng. services systems in buildings.
2. The role of eng. services systems in providing comfort and facilitating life of users of the building.
3. The basic principles of asset management in a building & facilities maintenance environment
4. Importance of Fire safety and its installation techniques
5. To Know the principle of Refrigeration and application
6. To Understand Electrical system and its selection criteria

COURSE OUTCOME

The students will be able to

1. Machineries involved in building construction
2. Understand Electrical system and its selection criteria
3. Use the Principles of illumination & design
4. Know the principle of Refrigeration and application
5. Importance of Fire safety and its installation techniques
6. Know the principle behind the installation of building services and to ensure safety in buildings

UNIT I MACHINERIES 9

Hot Water Boilers – Lifts and Escalators – Special features required for physically handicapped and elderly – Conveyors – Vibrators – Concrete mixers – DC/AC motors – Generators – Laboratory services – Gas, water, air and electricity

UNIT II ELECTRICAL SYSTEMS IN BUILDINGS 9

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations

UNIT III PRINCIPLES OF ILLUMINATION & DESIGN 9

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour – Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor – MSCP – MHCP – Lans of illumination –

Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

UNIT IV REFRIGERATION PRINCIPLES & APPLICATIONS 9

Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour – Subcooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors – Starters – Air handling units – Cooling towers – Window type and packaged air-conditioners – Chilled water plant – Fan coil systems – Water piping – Cooling load – Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems

UNIT V FIRE SAFETY INSTALLATION 9

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers

TOTAL : 45 HRS

TEXT BOOKS

1. E.R.Ambrose, “Heat Pumps and Electric Heating”, John and Wiley and Sons, Inc., New York, 2002.
2. Handbook for Building Engineers in Metric systems, NBC, New Delhi, 2005.

REFERENCES

1. Philips Lighting in Architectural Design, McGraw-Hill, New York, 2000.
2 A.F.C. Sherratt, “Air-conditioning and Energy Conservation”, The Architectural Press, London, 2005.
3 National Building Code.

17BECEOE03 MANAGEMENT OF IRRIGATION SYSTEMS 3 0 0 3 100

OBJECTIVES

1. To enable the students for a successful career as water management professionals.
2. To create a potential among students in the area of irrigation management with specific enrichment to synthesis of data and their analysis.
3. To expose the students the need for an interdisciplinary approach in irrigation water management
4. To providing a platform to work in an interdisciplinary team.
5. To provide students an ability to understand the applications of mathematical and scientific concepts to analyse intricate technical, social and environmental problems in irrigation water management and finding solutions for them.
6. To promote student awareness for a life-long learning process and inculcate professional ethics and codes of professional practice in water management.

OUTCOME

At the end of this the students will be in a capacity to

1. Understand the concepts of soil-water-plant relationship as well as to expose them to the principles and practices of crop production.
2. Exposure to ground water, hydraulics of ground water related to drainage, drainage concepts, planning, design and management of drainage related irrigation system management
3. Understand the various principles of irrigation management and to analyse the different types of irrigation systems and their performances based on service oriented approach.
4. Gain insight on local and global perceptions and approaches to participatory water resource management
5. Learn from successes and failures in the context of both rural and urban communities of water management.
6. Exposure on the use of economic concepts in irrigation development and to impart knowledge on economic planning so as to enable viable allocation of resources in the irrigation sector.

UNIT I. IRRIGATION SYSTEM REQUIREMENTS 9

Irrigation systems – Supply and demand of water – Cropping pattern – Crop rotation – Crop diversification – Estimation of total and peak crop water requirements – Effective and dependable rainfall – Irrigation efficiencies.

UNIT II. IRRIGATION SCHEDULING 9

Time of irrigation – Critical stages of water need of crops – Criteria for scheduling irrigation – Frequency and interval of irrigation

UNIT III. MANAGEMENT 9

Structural and non-structural strategies in water use and management – Conjunctive use of surface and ground waters – Quality of irrigation water.

UNIT IV. OPERATION 9

Operational plans – Main canals, laterals and field channels – Water control and regulating structures – Performance indicators – Case study

UNIT V. INVOLVEMENT OF STAKE HOLDERS 9

Farmer's participation in System operation – Water user's associations – Farmer councils – Changing paradigms on irrigation management – Participatory irrigation management

TOTAL : 45 HRS

TEXT BOOKS

1. Dilip Kumar Majumdar, "Irrigation Water Management – Principles and Practice", Prentice Hall of India Pvt. Ltd., New Delhi, 2000
2. Hand book on Irrigation Water Requirement, R.T. Gandhi, et. al., Water Management Division, Department of Agriculture, Ministry of Agriculture, New Delhi

REFERENCES

1. Hand Book on Irrigation System Operation Practices, Water Resources Management and Training Project, Technical report No. 33, CWC, New Delhi, 2000
2. Maloney, C. and Raju, K.V., "Managing Irrigation Together", Practice and Policy in India, Stage Publication, New Delhi, India, 2000

17BECEOE04 ADVANCED CONSTRUCTION TECHNOLOGY 3 0 0 3 100

OBJECTIVE:

1. To give an experience in the implementation of new technology concepts which are applied in field of Advanced construction.
2. To study different methods of construction to successfully achieve the structural design with recommended specifications.
3. To involve the application of scientific and technological principles of planning, analysis, design and management to construction technology.
4. To study of construction equipment's, and temporary works required to facilitate the construction process
5. To provide a coherent development to the students for the courses in sector of Advanced construction technology.
6. To present the new technology of civil Engineering and concepts related Advanced construction technology.

OUTCOMES:

1. Implementation of new technology concepts which are applied in field of Advanced construction.
2. Different methods of construction to successfully achieve the structural design with recommended specifications.
3. Application of scientific and technological principles of planning, analysis, design and management to construction technology.
4. Will gain the Knowledge of construction equipment's, and temporary works required to facilitate the construction process
5. Development to the students for the courses in sector of Advanced construction technology.
6. The new technology of civil Engineering and concepts related Advanced construction technology.

UNIT - I MODERN CONSTRUCTION METHODS 9

Open Excavation, Shafts and Tunnels- Preparation of foundation, Cofferdams, Caisson, Piled Foundation, Prestressed Concrete Construction, Pre-cast Concrete Construction.

UNIT - II CONSTRUCTION METHODS FOR SPECIAL STRUCTURES 9

Construction Methods For Bridges, Construction Methods for Roads, Construction Methods For Special Structures for Railways, Construction Methods for Dams, Construction Methods for Harbour, Construction Methods for River Works Pipelines

UNIT - III MODERN CONSTRUCTION EQUIPEMENTS -I 9

Construction Equipment used for Earth Moving, Excavating, Drilling, Blasting,Tunneling and hoisting

UNIT - IV MODERN CONSTRUCTION EQUIPEMENTS -II 9

Construction Equipment used for Conveying, Hoisting, Dredging, Dewatering Systems, Paving and concreting Plant

UNIT - V PRINCIPLES AND PRACTICES OF TEMPORARY STRUCTURES 9

Principles and Practices of Temporary structures, Shoring, and Strutting,Underpinning, Principles and Design of Formwork, Scaffolding, Operation and maintenance of construction equipments

TOTAL : 45 HRS

TEXT BOOKS

1.Peurifoyu , R. L., , Ledbette, W.B., Construction Planning , Equipment and Methods, Mc Graw Hill Co., 2000.

2. Antill J.M., PWD, Civil Engineering Construction, Mc Graw Hill Book Co., 2005

REFERENCE

1.Varma, M Construction Equipment and its Planning & Applications, Metropoltian Book Co., 2000

2.Nunnaly, S.W., Construction Methods and Management , Prentice – Hall, 2000

3.Ataev, S.S., Construction Technology, MIR , Pub. 2000.