08818-284577,284355Ext: 321;Fax: 08818-284577 Visitusat:www.srivasaviengg.ac.in

SRIVASAVIENGINEERINGCOLLEGE
(AUTONOMOUS)
(SponsoredbySriVasaviEducationalSociety)
ApprovedbyAICTE,NewDelhiandPermanentlyAffiliatedtoJNTUK,Kakinada Pedatadepalli,
TADEPALLIGUDEM – 534 101, W.G. Dist, (A.P.)
DepartmentofCivilEngineering

Dtd:20.08.2022

MinutesoftheBOSMeeting

Fifth BOS Meeting of Civil Engineering Department was held in online mode through Zoom platform (Meeting ID: 847 3592 7977) on18.08.2022 at 10:30 AM in the presence of the following members.

Sl.No	Name	Designation	Role
1	Dr.G. Radhakrishnan	Professor,Head,Dept.of CE,SVEC,Pedatadepalli	Chairperson
2	Dr.P.SubbaRao	Professor and Director of Faculty Development Centre,JNTUK,Kakinada	Member and SubjectExpert
3	Dr.C.B.Kameswara Rao	ProfessorofCE,NIT Warangal	Member and SubjectExpert
4	Dr.M.Kumar	Professor of CE, Osmania University	Member and SubjectExpert
5	Mr.Nagareddayya Subbagari	GeneralManager,Corporate QA/QC, M/S My Home ConstructionPvt.Ltd., Hyderabad	Member and IndustryExpert
6	Mr.T.Rajkumar	ResearchScholar,Dept.of CE,NIT,AndhraPradesh	Memberand Alumni
7	Dr.CH.Rambabu	ProfessorofEEEandDean, Student Affairs, SVEC, Pedatadepalli	Dean,Student Affairs
8	Mr.V.L.D. Prasad Reddy	Asst.Professor,Dept.ofCE, SVEC	Memberand FacultyofCivil Engineering
9	Mr. T NagaSeshu Babu	Asst.Professor,Dept.ofCE, SVEC	Memberand FacultyofCivil Engineering
10	Mr.BHemaSundar	Asst.Professor,Dept.ofCE, SVEC	Member and FacultyofCivil Engineering
11	Mr.K.Gowtham Kumar	Asst.Professor,Dept.ofCE, SVEC	Memberand Faculty of Civil Engineering

Followingarethe minutesoftheBOS Meeting:

1. The proposed course structure and syllabus of V, VI, VII& VIII semesters V20 Regulationisapprovedandthesamehavetobefollowedfortheacademicyears 2022-23 and 2023-24.
2. Basic core courses should not be included in list of professional elective courses.Each professional Elective Course shouldcontainadvancedcourses of all specializations.
3. CourseStructureofVsemester
    - Course related to Geotechnical Engineering specialization have tobe included in the list of Professional Elective Course I
4. CourseStructureofVIsemester
    - Course related to Geotechnical Engineering specialization have tobe included in the list of Professional Elective Course II
5. CourseStructureofVIIsemester
    - The core course i) Estimation Specification and Contracts and ii) Construction Project Planning and Systems have to be excluded from the list of Professional Elective Courses arranged as asingle Professional Core Course or Professional Core Course Lab.
    - Courseslikei)PRECASTANDPREFABRICATEDSTRUCTURESii) METROSYSTEMSENGINEERINGiii)QUALITYASSURANCEAND QUALITYCONTROLhave to be included in the list of Professional Elective Courses
6. CourseStructureofVIIIsemester
    - Projectshouldcontainpracticalhoursof24toaccommodatetheallotted 12 credits.
    - Tothepossibleextentprojectshouldcarriedfromthefieldactivity.
7. Syllabushavetodesignedkeepinginview ofGATE,IESandPublicService Commission exams
8. Knowledge Levels ofhigher order have to be maintained in the syllabuses of all courses.
9. VolumeandYearofPublicationofreferencesandtextbookshavetobeincluded in syllabuses
10. NPTELcoursesmayalsobeincludedinProfessionElectiveCourses

11. SyllabusofVsemester
    - Concept of MATRIX METHODS has to be included in the syllabus of Structural Analysis – II.
    - Concept of Green Concrete could be included in the syllabus of Advanced Concrete Technology
    - Rapid Chloride Permeability, Water Penetration Depth Test, Initialsurface absorption, water, chloride and sulphate absorption tests couldbe included in Advanced Concrete Technology
    - Pedestrian paths, bicycle paths studies, sky walk planning and parking management could be included in Unit II of Traffic Engineering& Management course.
    - Level of service concept, Flexible Progressive System, Rotary Planning and Design as per IRC to be included in Unit IV of Traffic Engineering& Management course.
12. Asamatterofcompletenessminordegreecourseshavetobeannounced.
13. Dept should contain licensed software's of courses mentioned under Skill Oriented Courses.

CHAIRPERSONOFBOS

Vision

TobeaDepartmentthat strivestowards quality education, research andconsultancy in Civil Engineering.

Mission

- Toprovidebroadandhighqualityeducationtoitsstudentsforasuccessfulprofessionalcareer.
- Toservetheconstructionindustrythroughdisseminationofknowledgeandtechnicalservicesto rural community and professionals.
- Toinculcateethicsandhuman values,effectivecommunication andleadershipqualities among students to meet the challenges of the society.

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5thMEETINGBOARDOFSTUDIES

Agenda:

1. **OpeningremarksbyBOSChairperson**
2. **Review of course structure for V,VI,VII & VIII semesters of B. Tech V20 Regulation**

   Theproposedcoursestructureof V,VI,VII&VIIIsemestersB.Techunder V20 Regulation is given in Annexure I.
3. **Approval of syllabi for the courses offered in** V,VI,VII & VIII **semesters**

   Thesyllabiforvariouscoursesofferedin V,VI,VII&VIIIsemestersB.Tech under V20 Regulation are given in Annexure II.
4. **Approval of list of courses offering under Open Elective& Mandatory Courses in** V,VI,VII & VIII**Semesters tootherbranchesandtheapproval of their detailed syllabi.**

   ThedetailsaregiveninAnnexure III.
5. **Anyotheritemwiththe permissionofchair.**

CHAIRPERSONOFBOS

ANNEXURE-I

COURSESTRUCTUREAPPROVEDIN2NDJOINTBOSMEETING(28/12/2020)

(For2020–2021AdmittedBatch)–V20Regulation

ISEMESTER

S.No	Course Code	CourseTitle	Hoursper week			Credits
			L	T	P	
1	V20MAT01	LinearAlgebraandDifferential Equations	3	0	0	3
2	V20PHT01	EngineeringPhysics	3	0	0	3
3	V20ENT01	EnglishforProfessional Enhancement	3	0	0	3
4	V20MEL01	EngineeringGraphics	1	0	4	3
5	V20CST01	ProgramminginCforproblem solving	3	0	0	3
6	V20ENL01	HoneYourCommunicationsSkills Lab-I	0	0	3	1.5
7	V20PHL01	EngineeringPhysicsLab	0	0	3	1.5
8	V20CSL01	ProgramminglabinCforproblem solving	0	0	3	1.5
9	V20CHT02	EnvironmentalStudies	2	0	0	-
		Total	15	0	13	19.5

TotalContactHours:28 TotalCredits:19.5

IISEMESTER

S.No	Course Code	CourseTitle	Hoursper week			Credits
			L	T	P	
1	V20MAT02	NumericalMethodsandVector Calculus	3	0	0	3
2	V20CHT01	EngineeringChemistry	3	0	0	3
3	V20MET01	EngineeringMechanics	3	0	0	3
4	V20EET02	BasicElectricalandElectronics Engineering	3	0	0	3
5	V20MEL02	EngineeringWorkshop	1	0	4	3
6	V20EEL02	BasicElectricalandElectronics EngineeringLab	0	0	3	1.5
7	V20CHL01	EngineeringChemistryLab	0	0	3	1.5
8	V20ENL02	HoneYourCommunicationsSkills Lab-II	0	0	3	1.5
		Total	13	0	13	19.5

TotalContactHours:26 TotalCredits:19.5

COURSE STRUCTURE APPROVED IN 4TH BOS MEETING (28/08/2021)

III SEMESTER

S.No	Course Code	CourseTitle	Hoursper week			Credits
			L	T	P	
1	V20MAT04	Probability&Statistics(BOSof Maths)	3	0	0	3
2	V20CET01	StrengthofMaterials	3	0	0	3
3	V20CET02	FluidMechanics&Hydraulics	3	0	0	3
4	V20CET03	SurveyingandGeomatics	3	0	0	3
5	V20CET04	BuildingMaterials&Concrete Technology	3	0	0	3
6	V20CEL01	StrengthofMaterials Lab	0	0	3	1.5
7	V20CEL02	SurveyingLab	0	0	3	1.5
8	V20CEL03	ConcreteTechnologyLab	0	0	3	1.5
9	V20SOC01	SkillOrientedCourse(Certificate course offered by Industries/Professional Bodies/APSSDC or any other accredited bodies)	1	0	2	2
10	V20ENT02	ProfessionalCommunication Skills-I(MNC)(BOSofEng)	2	0	0	0
		Total	18	0	11	21.5

TotalContactHours:29 TotalCredits:21.5

IV SEMESTER

S.No	Course Code	CourseTitle	Hoursper week			Credits
			L	T	P	
1	V20CET05	EngineeringGeology	3	0	0	3
2	V20CET06	StructuralAnalysis-I	3	0	0	3
3	V20CET07	WaterResourcesEngineering	3	0	0	3
4	V20CET08	TransportationEngineering	3	0	0	3
5	V20MBT51	ManagerialEconomics Financial Analysis (BOSofMBA)	3	0	0	3
6	V20CEL04	EngineeringGeologyLab	0	0	3	1.5
7	V20CEL05	FM&HydraulicMachineryLab	0	0	3	1.5
8	V20CEL06	TransportationEngineeringLab	0	0	3	1.5
9	V20SOC02	SkillOrientedCourse(Certificate course offered by Industries/Professional Bodies/APSSDCoranyother accredited bodies)	1	0	2	2
10	V20ENT03	ProfessionalCommunicationSkills-II(MNC)(BOSofEng)	2	0	0	0
Total			18	0	11	21.5

Total Contact Hours : 29 Total Credits : 21.5

Internshipfor 2months/MiniProjectismandatoryduringsummer vacationandis evaluated in V semester.

COURSE STRUCTURE PROPOSED FOR APPROVAL IN 5TH BOS MEETING

V SEMESTER

S.No	Course Code	CourseTitle	Hoursper week			Credits
			L	T	P	
1	V20CET09	StructuralAnalysis-II	3	0	0	3
2	V20CET10	GeotechnicalEngineering	3	0	0	3
3	V20CET11	DesignofReinforcedConcrete Structures	3	0	0	3
4	V20CET12 V20CET13 V20CET14 V20CET15 V20CET16	ProfessionalElectiveCourseI 1. AdvancedConcreteTechnology 2. IrrigationEngineering 3. TrafficEngineering& Management 4. AirPollutionandControl 5. GeoEnvironmental Engineering	3	0	0	3
5		Open Elective Course I / Job Oriented Elective	0	0	6	3
6	V20CEL07	GeotechnicalEngineeringLab	0	0	3	1.5
7	V20CEL08	StructuraldetailingusingAuto CAD Lab	0	0	3	1.5
8	V20SOC03	Skill Advanced Course /Soft Skills Course	1	0	2	2
9	V20ENT04	ProfessionalCommunication Skills-III(MNC)(BOSofEnglish)	2	0	0	0
10	V20CESI1	SummerInternship/MiniProject	0	0	0	1.5
		Total	15	0	14	21.5

TotalContactHours:27 TotalCredits:21.5

VI SEMESTER

S.No	Course Code	CourseTitle	Hoursper week			Credits
			L	T	P	
1	V20CET17	DesignofSteelStructures	3	0	0	3
2	V20CET18	FoundationEngineering	3	0	0	3
3	V20CET19	EnvironmentalEngineering	3	0	0	3
4	V20CET20 V20CET21 V20CET22 V20CET23 V20CET24	ProfessionalElectiveCourse–II 1. BridgeEngineering 2. EarthRetainingstructures 3. UrbanHydrologyand Hydraulics 4. PavementAnalysisandDesign 5. RemotesensingandGIS	3	0	0	3
5		OpenElectiveCourse–II/Job Oriented Elective	3	0	0	3
6	V20CEL09	EnvironmentalEngineeringLab	0	0	3	1.5
7	V20CEL10	CAD&GISLab	0	0	3	1.5
8	V20CEL11	Estimation,Contractsand ConstructionManagementLab	0	0	3	1.5
9	V20SOC04	Skill Advanced Course /Soft Skills Course	1	0	2	2
10	V20CEMC01	IntellectualPropertyRights& Patents(MNC)	2	0	0	0
		Total	18	0	11	21.5

Total Contact Hours: 30 Total Credits : 21.5

Internship 2 months / Mini Project is mandatory during summer vacation and isevaluated in VII semester.

VII SEMESTER

S.No	Course Code	CourseTitle	Hoursper week			Credits
			L	T	P	
1	V20CET25 V20CET26 V20CET27 V20CET28 V20CET29	ProfessionalElectiveCourseIII 1. PrestressedConcrete 2. AdvancedFoundation Engineering 3. GroundWaterDevelopment 4. HighwayConstructionand Management 5. EnvironmentalImpact Assessment and Management	3	0	0	3
2	V20CET30 V20CET31 V20CET32 V20CET33 V20CET34	ProfessionalElectiveCourseIV 1. FiniteElementMethods 2. EngineeringwithGeo-synthetics 3. UrbanTransportation Planning 4. SolidWasteManagement 5. PrefabricatedStructures	3	0	0	3
3	V20CET35 V20CET36 V20CET37 V20CET38 V20CET39	ProfessionalElectiveCourseV 1. EarthquakeEngineering 2. GroundImprovement Techniques 3. Rural Water Supply and onsitesanitationSystems 4. MetroSystemsand Engineering 5. ArchitectureandTown Planning	3	0	0	3
4		Open Elective Course III / Job oriented	3	0	0	3
5		Open Elective Course IV / Job oriented	3	0	0	3
6	V20MBT54	Humanities and Social Science Elective UniversalHumanValues-II (BOSofMBA)	3	0	0	3
7	V20SOC05	SkillAdvancedCourse	1	0	2	2
8	V20CESI2	SummerInternship/MiniProject	0	0	0	3
		Total	19	0	2	23

TotalContactHours: 23 TotalCredits: 23

VIII SEMESTER

S.No	Course Code	CourseTitle	Hoursper week			Credits
			L	T	P	
1		Projectwork,seminarand internshipinindustry	0	0	24	12
		Total	0	0	24	12

TotalContactHours:0 TotalCredits:12

SkillOrientedCourses
1. TotalStation 2. 2DDrafting&3DModeling 3. BuildingPlanningandDrawing 4. BuildingInformationModeling 5. RevitArchitectureSoftware 6. AdvancedC 7. ETABSSoftware 8. PrimaveraSoftware

ANNEXURE–II

SYLLABIOFVtoVIIISEMESTERSOFB.TECHCOURSESFORTHEACADEMIC YEAR 2022-23 & 2023-24

VSEMESTER–SYLLABUS

Sem	VSem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET09
Name ofthe Course	STRUCTURALANALYSIS–II					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- Computethemomentsandreactionsfortwohingedandthreehinged arches (K3)
- Analyzethecontinuous beams using Moment distribution andKani's methods (K4)
- Assesstheloaddistributionindifferentcomponentsof Suspensionbridges (K3)
- AnalyzethestructureforLateralloadsusingdifferentmethods(K4)
- Computethemomentsandforcesusingmatrixmethods(K3)

SYLLABUS

UNIT I

ThreeHingedArches: Elastic theory ofarches– Eddy's theorem– Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature, Hinges with support at different levels.

Two Hinged Arches: Determination of horizontal thrust, bendingmoment, normal thrust and radial shear – Rib shortening and temperature stresses.

UNITII

Moment Distribution Method: Introduction Stiffness and carry over factors – Distribution factors – Analysis of continuous beams with and without sinking of supports.

Kani's Method: Introduction – Rotational factor, Analysis of continuous beams – including settlement of supports.

UNITIII

Cable Structures and Suspension Bridges: Introduction, characteristics of cable, analysis of cables subjected to concentrated and uniformly distributed loads, anchor cable, temperature stresses, analysis of simple suspension bridge.

UNITIV

Lateral Load Analysis on Frames: Approximate Methods, Portal Method and Cantilever Method, Computational techniques, algorithms.

UNITV

Introduction to MatrixMethods: Flexibility methods: Introduction, application to continuous beams (maximum of two unknowns). Stiffness method:Introduction, application to continuous beams (maximum of two unknowns).

TextBooks:

1. Structural Analysis, T. S. Thandavamoorthy, Oxford university press, India.
2. StructuralAnalysis,R.C.Hibbeler,PearsonEducation,India
3. TheoryofStructures –II,B.C.Punmia,Jain&Jain,LaxmiPublications, India.
4. StructuralAnalysis,C.S.Reddy,TataMc-Grawhill,NewDelhi.
5. StructuralAnalysis-Vol.IandII,S.S.Bhavikatti,VikasPublishing House,New Delhi.

References:

1. IntermediateStructuralAnalysis,C.K.Wang,TataMcGrawHill,India
2. Theoryofstructures,Ramamuratam,DhanpatraiPublications.
3. Analysisofstructures,Vazrani&Ratwani–KhannaPublications.
4. Comprehensive Structural Analysis-Vol. I & 2, R. Vaidyanathan & P. Perumal- Laxmi Publications Pvt. Ltd., New Delhi
5. StructuralAnalysisI,P.N.Chandramouli.YesdeePublishingPvtLimited
6. StructuralAnalysis,AslamKassimali,CengageLearning
7. Matrix Methods of Structural Analysis, P.N. Godbole, R. S. Sonaparote, PHI Learning Pvt Limited

Sem	VSem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET10
Name ofthe Course	GEOTECHNICALENGINEERING					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- Developtheinter-relationshipsbetweenvariousparametersofthesoils(K3)
- Assessthepermeabilityofsoilshavingdifferentproperties(K3)
- Employdifferentmethodstoknowthestressdistributioninsoils(K3)
- Interpret different parameters related to compaction and consolidation of soils (K3)
- Examinethe stressstrain behaviorof soilsundervariousdrainage conditions(K3)

SYLLABUS

UNIT I

SoilPropertiesandClassification: Soilformation–soilstructureandclay mineralogy – Adsorbedwater – Mass-volumerelationship –Relativedensity,Index Properties of Soils, Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – Various Types of soil Classifications – Unified soil classification and I.S. Soil classification.

UNITII

Permeability: Soil water – capillary rise – One dimensioned flow of water through soils – Darcy's law- permeability – Factors affecting –laboratory determination of coefficient of permeability –Permeability of layered systems. Total, neutral and effective stresses – quick sand condition –2-DflowandLaplace'sequation- Seepage through soils – Flow nets: Characteristics and Uses.

UNITIII

Stress Distribution in Soils: Stressesinduced by appliedloads- Boussinesq's and Westergaard's theories for point loads and areas of different shapes– Newmark'sinfluence chart – 2:1 stress distribution method.

UNITIV

Compaction: Mechanism of compaction – factors affecting – effects of compaction on soil properties - compaction control.

Consolidation: Compressibility of soils – e-p and e-log p curves – Stress history – Concept of consolidation - Spring Analogy - Terzaghi's theory of one-dimensional Consolidation – Time rate of consolidation and degree of consolidation – Determinationofcoefficientofconsolidation(cv) -Overconsolidatedandnormally consolidated clays.

UNITV

Shear Strength of Soils: Basic mechanism of shear strength - Mohr – Coulomb Failuretheories–Stress-StrainbehaviorofSands-CriticalVoidRatio–Stress-

Strainbehaviorofclays–ShearStrengthdetermination-variousdrainage conditions.

TextBooks:

1. "Basic and Applied Soil Mechanics", Gopal Ranjan and A. S. R. Rao, New Age International Publishers.
2. "SoilMechanicsand FoundationEngineering",V. N. S. Murthy,CBS publishers.
3. "SoilMechanicsandFoundations",B.C.Punmia,LaxmiPublications.

References:

1. "FundamentalsofSoilMechanics",D.W.Taylor,Wiley.
2. "Anintroduction toGeotechnical Engineering", Holtz andKovacs; PrenticeHall.
3. "Fundamentals of Geotechnical Engineering", B M Das, Cengage Learning, New Delhi.

Sem	VSem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET11
Name ofthe Course	DESIGNOFREINFORCEDCONCRETESTRUCTURES					
Branch	CIVILENGINEERING					

CourseOutcomes:
Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- Designthebeamsinworkingstressandlimitstatemethods (K5)
- Design the doubly reinforced and flanged (T and L) beam sections for flexure(K5)
- Designthecontinuous beamsforshearandbond (K5)
- Designtheoneway,twowayslabsandstaircaseofbuildings(K5)
- Designthecolumnsandfootingsofthestructures(K5)

SYLLABUS

UNIT I
Introduction of Reinforced concrete: Structural elements- Loads on structures- Strength and serviceability - Methods of design - Working stress method- design constants - neutral axis - moment of resistance for different sections- Design of singly beams- Concepts of limit state design - Partial load and safety factors - stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design – stress - block parameters – limiting moment of Resistance. Codes of practice.

UNITII
Design for Flexure: Limit state analysis and design of singly reinforced sections- effective depth- Moment of Resistance- Doubly reinforced and flanged (T and L) beam sections- Minimum depth for a given capacity- Limiting Percentage of Steel- Minimum Tension Reinforcement-Maximum Flexural Steel- Design of Flanged Sections (T&L)- Effective width of flange –Behavior- Analysis and Design.

UNITIII
Design for Shear and Bond and continuous beams: Limit state analysis anddesignofsectionforshear–conceptofbond,anchorageanddevelopmentlength, I.S.codeprovisions.
Designexamplesinsimplysupportedandcontinuousbeams,detailing.Limit state design for serviceability: Deflection, cracking and code provision.

UNITIV
Slabs: Classification of slabs, design of one - way slabs, one way continuous slab using IS Coefficients (Conventional) – Design of two - way slabs-simply supported and various edge conditions using IS Coefficients, Design of Stair Case.

UNITV

Design of Compression members and footings: Effective lengthofacolumn,Design ofshortandlongcolumns–underaxialloads,uniaxialbendingand biaxial bending – IS Code provisions.

Footings: Different types of footings – Design of isolated footings – square,rectangular.

NOTE:

Allunitsi.e.fromunitIItounitVIaretobetaughtinLimitStateDesign. Following sheets should be prepared by the students.

Sheets-1 ReinforcementdetailingofT-beams,L-beamsandcontinuousbeams.
Sheets-2 Reinforcement detailing of beam with all details.
Sheets-3 Detailingofone-way,two-wayandcontinuousslabs.
Sheets-4 Reinforcement detailing of columns.
Sheets-5 Reinforcementdetailingofisolatedfootings.

ExaminationPattern:

InternalExaminationPattern:

Thetotalinternalmarksaredistributedinthreecomponentsasfollows:
Descriptive (subjective type) examination : 15 marks
Detailing sheets(For above) :10marks
Assignment : 05 marks

TextBooks:

1. "LimitState Design", A.K.Jain
2. "DesignofReinforcedconcreteStructures",N.Subrahmanyian.
3. "Reinforcedconcrete",Vol.1.,H.J.Shah,CharotarpublishinghousePvt. Ltd.

References:

1. "R C C Design", B.C Punmia, A. K. Jain and A. K Jain. Lakshmi Publications
2. "Reinforced Concrete Structures", N. Krishna Raju and R. N. Pranesh, New Age Publications.
3. "Reinforced Concrete Structures", S. Unnikrishna Pillai and Devdas Menon, Tata Mc.GrawHill,NewDelhi.
4. IS456-2000,CodeofpracticeforReinforcedConcreteStructures.
5. IS875,CodeofPracticeforDesignLoads.
6. SP-16,DesignAidsforReinforcedConcrete.

Sem	VSem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET12
Name ofthe Course	ADVANCEDCONCRETE TECHNOLOGY(Professional Elective-1)					
Branch	CIVILENGINEERING					

CourseOutcomes

Uponsuccessfulcompletionofcoursethestudentswillbeableto

- Relatethematerialcharacteristicsandtheirinfluenceonconcrete(K3)
- Predictconcretebehaviorbasedonitsdurabilityproperties(K3)
- Illustratemixproportioningofdifferenttypesofconcretesandtheirtesting (K3)
- Selectthesuitableconcretebasedontheirspecificapplication(K3)
- Employ suitable concreting methods to place the concretebasedon requirement (K3)

SYLLABUS

UNITI

Ingredients of Concrete: Cement –chemical composition and their importance, hydration of cement, types of cement, testing of cement.

Fine aggregate: Functions, requirement, Alternatives to River sand, M-sand introduction and manufacturing.

Coarse aggregate: Importance of size, shape and texture. Grading and blending of aggregate,testingonaggregate,requirement,RecycledaggregatesWater–qualities of water.

Chemical admixtures: Plasticizers, accelerators, retarders and air entraining agents.

Mineral admixtures: Pozzolanic and cementitious materials, Fly ash, GGBS, silica fumes, Metakaolin and rice husk ash, Green concrete.

UNITII

Durability of Concrete: Durability, Transport mechanism of fluids and gases in concrete, cracking in concrete - corrosion and carbonationinducedcracking,Alkali Aggregate Reaction, degradation by freeze and thaw, chloride attack, sulphate and sea water attack (marine conditions). Hot and cold weather concreting, water penetration and rapid curing tests.

UNITIII

Concrete Mix Design: Design of concrete mixes by IS code method - ACI method Design of high strength concrete mixes, design of fly-ash cement concrete mixes, design of high density concrete mixes.

TestingofConcrete: Test methods: Analysis of fresh concrete, Accelerated testing methods, Tests on hardened concrete, Core cutting and testing, partially destructive testing, Non-destructive testing of concrete structure

UNITIV

Special Concrete: Lightweight concrete, autoclaved aerated concrete, no-fines concrete, lightweight aggregate concrete and foamed concrete, High strength concrete, refractory concrete, high density and radiation-shielding concrete, polymer concrete, fibre-reinforced concrete, mortars, renders, recycled concrete, Ferro Cement, Self Compacting Concrete.

UNITV

Special processes and technology for particular types of structure: Sprayed concrete, underwater concrete, grouts, grouting and grouted concrete, mass concrete, slip form construction, pumped concrete, concrete for liquid retaining structures, vacuum process

TextBooks:

1. Neville,A.M.,PropertiesofConcrete,PearsonEducationAsia(P)Ltd, England, 2000.
2. ConcreteTechnology,GambhirM.L,TataMcGrawHill
3. ConcreteTechnology,M.S.Shetty,S.Chand&CompanyNewDelhi
4. Concretemicrostructure,properties&materials,P.KumarMehata,Paulo& J.M.Monteiro,
5. Light WeightConcrete,Short&Kenniburg,Asia PublishingHouse,Bombay

References:

1. N.V.Nayak,A.K.JainHandbookonAdvancedConcreteTechnology,ISBN: 978-81-8487-186-9
2. JobThomas,"ConcreteTechnology",CENGAGELearning,2015.
3. IS 4926 (2003): Code of Practice Ready-Mixed Concrete [CED 2: Cement and Concrete] Criteria for RMC Production Control, Basic Level Certification for Production Control of Ready Mixed Concrete BMTPC.
4. Specification and Guidelines for Self-Compacting Concrete, EFNARC, Association House.

Sem	VSem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET13
Name ofthe Course	IRRIGATIONENGINEERING(ProfessionalElective-1)					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthecourse,thestudentwillbeableto**:**

- Interpretthequalityofirrigationwaterandwaterrequirements(K2)
- Designtheerodibleandnon-erodiblecanalsusingdifferenttheories(K5)
- Assesdifferentirrigationcanalstructures(K3)
- Relatethediversionheadworksandtheircomponents(K3)
- AnalyzethestabilityofGravityandEarthdams(K3)

SYLLABUS

UNIT I

Irrigation&WaterRequirements:Definition–ImportanceofIrrigationinIndia– Advantages and Dis advantages – Types of Irrigation – Quality of Irrigation water - Different types of crops and crop seasons- Soil, water and plant relationship-Irrigation efficiencies -Crop water requirement-Duty and Delta-Factors affecting duty-Depth and Frequency of Irrigation-crop rotation.

UNITII

Canals: Classification-Alluvial and Non Alluvial canals-Design of non-erodible canals-Different command areas-Methods of economic section and maximum permissible velocity-Design of erodible canals-Kennedy's silt theory and Lacey's regime theory.

UNITIII

Canalstructures:Falls-Typesandlocation-DesignprincipleofSardatypewall and straight glacis wall

Regulators: Headandcrossregulators–designprinciples

CrossDrainageworks: Designprinciples ofaqueduct-siphonaqueduct-super passage

UNITIV

Diversion HeadWorks: Types of diversion head works-Weirs and Barrages-Layoutof diversion head works-components- causes and failures of weirs on permeable foundations-Bligh'screeptheory-Khosla'stheory-exitgradient.

UNITV

Reservoir planning: Site selection-Types of dams- selectionoftypeofdam-selection of site for a dam.

Gravity Dams: Forces acting on gravity dam-causes of failure of gravity dam-elementary profile and practical profile of gravity dam-limiting height of dam-stability analysis-drainage galleries.

Earthen Dams: Types of earthen dams-causes of failure-criteria for safe design-seepage-measures of control of seepage filters.

TextBooks:

1. IrrigationEngineeringandHydraulicstructures,SantoshKumarGarg, Khanna Publishers.
2. IrrigationandWaterpowerEngineering,B.C.Punmia,PandeB.B.Lal, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publications Ltd.
3. WaterresourcesandIrrigationengineeringbySriKrishnapublications.

References:

1. IrrigationandWaterResourcesEngineering,AsawaGL(2013),NewAge International Publishers.
2. Irrigation Water Resources and Water Power Engineering, Modi P N (2011), Standard book House, New Delhi.
3. IrrigationandDrainageEngineering"byPeterWallerandMulunehYitayew

Sem	VSem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET14
Name ofthe Course	TRAFFICENGINEERINGANDMANAGEMENT (ProfessionalElective–I)					
Branch	CIVILENGINEERING					

CourseOutcomes:
Uponsuccessfulcompletionofthecoursethestudentwillbeableto:

- UnderstandbasicsprinciplesofTrafficEngineering(K2)
- Analyzeparkingdataandmodelaccidents(K3)
- Determinetrafficcapacityandlevelofservice(K3)
- DesignofSignalizedsystemsandRotaryIntersections(K5)
- Employ engineering techniques to achieve safe and efficient movement ofpeople andgoodsonroadways(K3)

SYLLABUS

UNIT I
Traffic Studies (Part- I) : Basic principles of Traffic, Volume, Speed and Density; Definitions and their interrelationships; Traffic Volume studies - Objectives, Methods of Volume counts, Presentation of Volume Data; Speed studies- Types of Speeds, Objectives, Methods of speed studies, Presentation of speed data. Delay Studies; Head ways and Gap Studies - Headway and Gap acceptance, Origin and Destination Studies.

UNITII
TrafficStudies(Part-II): ParkingStudies:parametersofparking,definitions, Parking
inventory study, Parking survey by Patrolling method; Analysis of Parking Survey data; Parking Management
Accident studies - Causative factors of Road accidents, Accident data collection: Road Safety Auditing, Measures to increase Road safety.Pedestrianstudies, Bicycle path studies, sky walk planning.

UNITIII
Capacity and LOS Analysis: Introduction to Traffic capacity, Analysis concepts, Level of Service, Basic definitions, Factors affecting Capacity and LOS as per Indo-HCM,Capacity of Urban/Rural Highway, With or without access control, Basic freeway segments-Service flow rate of LOS, Lane width or Lateral clearance adjustment; Heavy vehicle adjustment; Driver population adjustment.

UNITIV
Design of Signal and Intersections: Fixed Time signals, Determination of Optimum Cycle length and Signalsetting for Fixed Time signals, Flexible progressive system, Warrants for Signals, Signal Coordination.
Rotary planning , Rotary Design as per IRC:65, Weaving angles, Entry width, Exit Radius, Capacity of Rotary, Types of interchanges, Implementation.

UNITV

Transportation System Management: Measures forImprovingvehicularflow–onewayStreets,SignalImprovement,TransitStopRelocation,Reversible lanes - Reducing Peak Period Traffic - Strategies for working hours,CongestionPricing, Differential Toll Policies.

TextBooks:

1. Traffic Engineering and TransportationPlanning – L.R.Kadiyali, Khanna Publishers
2. PrinciplesofHighwaysEngineeringandTrafficAnalysis - FredMannering&Walter Kilareski,JohnWiley&SonsPublication.
3. Transportation Engineering - An Introduction - C. Jotin Khisty, Prentice Hall Publication.

References:

1. Fundamentals of Transportation Engineering - C. S. Papacostas, Prentice Hall India.
2. Traffic Engineering - Theory & Practice - Louis J.Pignataro, Prentice Hall Publication.
3. TrafficEngineeringbyRogerP.Roess,WilliamR.Mc.Shane,ElenaS. Prassas , Prentice Hall,1977.
4. IRC-65-2017:Guidelines for Planningand Design ofRoundabouts (First Revision)
5. IRC-93-1985:Guidelines fordesignandinstallationofroadtraffic signals
6. Indian Highway capacity manual (Indo-HCM) – 2017,Published by CSIR-CRRI, New Delhi.

Sem	VSem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET15
Name ofthe Course	AIRPOLLUTION ANDCONTROL (ProfessionalElective–I)					
Branch	CIVILENGINEERING					

CourseOutcomes:
Uponsuccessfulcompletionofthiscourse,thestudentswillbeableto:

- Assesthepollutantsandambientqualityofair(K3)
- Illustratetheplumebehaviorinaprevailingenvironmentalcondition(K3)
- Examinecarboncreditsforvariousdaytodayactivities(K3)
- Selectpropertechniquetocontroltheairparticulates(K3
- Chooseappropriateinplantcontrolmeasuresfordifferentemissions(K3)

SYLLABUS:

UNITI
Air Pollution: Sampling and analysis of air pollutants,conversionofppmintoμg/m3. Definition of terms related toairpollutionandcontrol-secondarypollutants– Indoorairpollution–OzoneholesandClimateChangeanditsimpact
-CarbonTrade.

UNITII
Meteorology and Air Pollution: Properties of atmosphere: Heat, Pressure, Wind forces, Moisture and relative Humidity, Lapse Rates - Influence of Terrain and Meteorological phenomena on plume behaviour and Air Quality - Wind rose diagrams and Isopleths Plume Rise Models

UNITIII
Ambient Air Quality Management: Monitoring of SPM - RPM SO2; NOx and CO - Stack Monitoring for flue gases - Micro-meteorological monitoring – Noise Monitoring - Weather Station. Emission Standards- Gaussian Model for Plume Dispersion

UNITIV
Air Pollution Control: Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control Equipments – Settling Chambers, Cyclone separators –Fabric filters–Scrubbers, Electrostatic precipitators

UNITV
Air Pollution Control Methods: Control of NOx and SOx emissions – Environmental friendly fuels - In-plant Control Measures, process changes, methods of removal and recycling. Environmental criteria for setting industries and green belts.

TextBooks:
1. Air Pollution and Control, K.V.S.G. Murali Krishna, Laxmi Publications, New Delhi,
2015

2. AirPollution,M.N.RaoandH.V.N.Rao,TataMcGrawHillCompany.
3. Environmental Science and Engineering by J.G. Henry and G.W. Heinke – Pearson
Education.

References:

1. An Introduction to Air pollution, R. K. Trivedy and P.K. Goel, B.S. Publications.
2. AirPollutionbyWarkandWarner-Harper&Row,NewYork.

Sem	VSem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET16
Name ofthe Course	GEO-ENVIRONMENTALENGINEERING(Professional Elective–I)					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- IdentifytheGeo-environmentalpollutantsandtheirgoverningfactors(K2)
- Employthetechniquesforsafedisposalofwaste(K3)
- Relatethesubsurfacecontaminationtransport(K3)
- Practicetheutilizationofsolidwasteforsoilstabilization(K3)
- Selectdifferentremediationtechniquestoimprovecontaminatedsoil(K3)

SYLLABUS

UNIT I

IntroductiontoGeoEnvironmentalEngineering: Environmentalcycle–Sources, production and classification of waste – Causes of soil pollution – Factors governing soil pollution interaction clay minerals - Failures of foundationdueto waste movement.

UNITII

Safe Disposal of Waste: Site selection for landfills – Characterization of land fill sites and waste –Risk assessment – Stability of landfills– Current practice of waste disposal – Monitoring facilities – Passive containment system – Application of geosynthetics in solid waste management – Rigid or flexible liners.

UNITIII

Transport Of Contaminants : Contaminant transport in sub surface - Advection, Diffusion, Dispersion – Governing equations –Contaminanttransformation–Sorption – Biodegradation – Ion exchange – Precipitation–Hydrologicalconsideration in land fill design – Ground water pollution.

UNITIV

Stabilization: Solidification of wastes – Microandmacroencapsulation– Absorption,Adsorption,Precipitation–Detoxification–Mechanismofstabilization – Organic and inorganic stabilization – Utilization ofsolidwasteforsoil improvement – case studies.

UNITV

Remediation of Contaminated Soils: Exsitu and Insitu remediation- Solidification, bio-remediation, incineration, soil washing, phyto remediation, soil heating, vetrification, bio-venting.

TextBooks:

1. Hari D. Sharma and Krishna R. Reddy, “Geo-Environmental Engineering” – John Wileyand Sons,INC,USA,2004.
2. Daniel B.E., “Geotechnical Practice for waste disposal”, Chapman& Hall, London 1993.

3. Manoj Datta," Waste Disposal in Engineered landfills", Narosa Publishing House, 1997.
4. ManojDatta,B.P.Parida,B.K.Guha,"IndustrialSolidWasteManagement and Landfilling
Practice",NarosaPublishingHouse,1999.

References

1. Westlake, K, "Landfill Waste pollution and Control", Albion Publishing Ltd., England, 1995.
2. Wentz,C.A.,"HazardousWasteManagement",McGrawHill,Singapore,1989
3. ProceedingsoftheInternationalsymposiumon"Environmental Geotechnology" (Vol.I and II).
EnvironmentalPublishing Company,1986and1989.
4. Ott,W.R.,"Environmentalindices,TheoryandPractice",AnnArbor,1978.
5. Fried,J.J.,"GroundWaterPollution",Elsevier,1975.
6. ASTM Special Tech. Publication 874, Hydraulic Barrier in Soil and Rock, 1985.
7. Lagrega, M.D., Buckinham, P.L. and Evans, J.C., "HazardousWaste Management" McGraw
HillInc.Singapore,1994.

Sem	VSem	L	T	P	C	COURSECODE
Regulation	V20	0	0	3	1.5	V20CEL07
Name ofthe Course	GEOTECHNICALENGINEERINGLAB					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- Employindexpropertiesrequiredforclassificationofsoils(K3)
- Findthepermeabilityofdifferentsoilsusingdifferenttests(K3)
- Predictthecompaction,consolidationandswellingcharacteristicsofthe soils (K3)
- Computethestrengthpropertiesofsoils(K3)

ListofExperiments

1. Specificgravity,G
2. Atterberg'sLimits.
3. Fielddensity-CorecutterandSandreplacementmethods
4. Grainsizeanalysisbysieving
5. HydrometerAnalysisTest
6. Permeabilityofsoil-ConstantandVariableheadtests
7. Compactiontest
8. Consolidationtest(tobedemonstrated)
9. DirectSheartest
10. TriaxialCompressiontest(UUTest)
11. Unconfined Compression test
12. Vane Shear test
13. Differential free swell (DFS)
14. CBRTest

ListOfEquipments

1. Casagrande'sliquidlimitapparatus.
2. Apparatusforplasticandshrinkage limits
3. Fielddensityapparatusfor
   a) Corecutter method
   b) Sandreplacementmethod
4. Setofsieves:4.75mm,2mm,1mm,0.6mm,0.42mm,0.3mm,0.15 mm, and 0.075mm.
5. Hydrometer
6. Permeabilityapparatusfor

a) Constantheadtest
b) Variableheadtest

7. UniversalautocompactorforI.Slightandheavycompaction tests.
8. Shakingtable,funnelforsandrainingtechnique.
9. ApparatusforCBRtest

10. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
11. Onedimensionalconsolationtestapparatuswithallaccessories.
12. Triaxialcellwithprovisionforaccommodating38mmdiaspecimens.
13. Boxsheartestapparatus
14. Laboratoryvaneshearapparatus.
15. Hotairovens(rangeoftemperature500-1500C

References:

1. DeterminationofSoilProperties,J.E.Bowles.
2. IS:2720–RelevantPartsofBureauofIndianStandards,New Delhi.

Sem	VSem	L	T	P	C	COURSECODE
RegulationYear	V203	0	0	3	1.5	V20CEL08
Name ofthe Course	STRUCTURALDETAILINGUSINGAUTOCAD					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- Employdetailingofdifferentbuildingcomponents(K3)
- Employdetailingofretainingwalls(K3)
- Employdetailingofwatertanks(K3)
- Employdetailingofseptictank(K3)

AutoCAD(2Drafting)

1. Detailingofslab(Oneway&twowayslabs)
2. Detailingofstaircase(dogleggedstaircase)
3. Detailingoffoundation(isolated,combinedfoundation)
4. Detailingofbeamsandcolumnsin frame
5. Detailingofretainingwall(gravity)
6. Detailing ofcolumnbase
7. Detailingofrooftruss(kingandqueenpost)
8. Detailingofboxculvert
9. Detailingofwatertank
10. Detailingofseptictank

VISEMESTER–SYLLABUS

Sem	VISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET17
Name ofthe Course	DESIGNOFSTEELSTRUCURES					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- Designtheriveted,boltedandweldedconnection(K5)
- Designthebeamsagainstdeflection,shear,buckling,andbearing(K5)
- Designoftension,compressionand rooftrussesfordifferentloading conditions(K5)
- Designthecompressionmembersandcolumnfoundations(K5)
- Designtheplategirderandgantrygirder(K5)

SYLLABUS

UNIT I

Connections: Introduction - Properties of structural steel - IS Rolled sections - I.S Specifications - Lap and Butt connections (Revited and Bolted connections) - Eccentric connections.

Welded connections: Introduction - Advantages and disadvantages of welding- Strength of welds - Butt and fillet welds - Permissible stresses - IS Code requirements - Design of Butt and fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints.

UNITII

Beams: Allowable stresses - Design requirements as per IS Code-Design of simple and compound beams - Curtailment of flange plates - Beam to beam connection - checkfordeflection,shear,buckling,andbearing-Designoflaterally unsupported beams.

UNITIII

Tension Members: Introduction to different modes of failures - gross section yielding - Net Section rupture and block shear failure - Determine the design strength due to yielding of gross section - rupture of critical section and block shear - Design of tension members.

Compression Members: Effective length of columns -Slendernessratio-permissiblestresses-Designofcompressionmembers,DesignofStruts.

RoofTrusses: Different types of trusses – Design loads – Load combinations as per IS Code recommendations, structural details –Design of simple roof trusses involving the design of purlins, members and joints.

UNITIV

Built upcompressionmembers: Designoflacingsandbattens.DesignSplicing of columns.

Design of Column Foundations: Introduction - Design of slab base - Design of gusset base- Column bases subjected to moment.

UNITV

Design of Plate Girder: Introduction - Design consideration - IS Code recommendations - Design of plate girder - Welded -curtailment of flange plates and stiffeners - splicing and connections.

Design of Gantry Girder: Introduction - Impact factors - longitudinal forces- Design of Gantry girders.

NOTE:
All units i.e. from unit II to unit-VI to be taught in Limit State method only.
Welding Connections should be used from Unit II – Unit V.
The students should prepare the following sheets.
Sheets-1 DetailingofsteelmembersConnection.
Sheets-2 Detailing ofbeamsincluding curtailmentofflange plates.
Sheets-3 Detailing of Column including lacing and battens.
Sheets-4 DetailingofColumnbases,slabbaseandgussetedbase.
Sheets-5 DetailingofPlategirderincludingcurtailment,splicingandstiffeners.

EXAMINATIONPATTERN:
InternalExaminationPattern:
Thetotalinternalmarksaredistributedinthreecomponentsasfollows:

Descriptive (subjective type) examination : 15 marks
Detailing sheets(For above) : 10marks
Assignment : 05 marks

TextBooks:

1. Designofsteelstructures,S.K.Duggal,TataMcGrawHill,andNewDelhi.
2. Design of steel structures, S.S.Bavakatti, I.K.International Publishing House Pvt. Ltd.
3. Steel Structures Design and Practice, N.Subramanian, Oxford University Press.
4. Design of Steel Structures, Ramachandra, Scientific Publishers Journals Dept.

References:

1. StructuralDesigninSteel,SarwarAlamRaz,NewAgeInternational Publishers, New Delhi.
2. DesignofSteelStructures,P.Dayaratnam,S.ChandPublishers.
3. DesignofSteelStructures,M.Raghupathi,TataMc.Graw-Hill.
4. StructuralDesignandDrawing,N.KrishnaRaju,UniversityPress.
5. IS:800-2007,Generalconstructioninsteel-Codeofpractice.
6. IS: 875-1987,Code ofPracticeforDesignLoads.
7. SteelTables

Sem	VISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET18
Name ofthe Course	FOUNDATIONENGINEERING					
Branch	CIVILENGINEERING					

CourseOutcomes:
Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- Employthesoilexplorationandcarryoutthefieldtesting(K3)
- Examinetheslopestabilityandearthpressuresusingdifferenttheories(K3)
- Determinethebearingcapacityofshallowfoundationsusingbearing capacity criteria (K4)
- Determinethebearingcapacityofshallowfoundationsusingsettlement criteria (K4)
- Designthedeepfoundationsfordifferentloadingandsoilconditions(K5)

SYLLABUS

UNIT I
Soil Exploration: Need, Methods of soilexploration–BoringandSampling methods, Field tests,PenetrationTests,Pressuremeter,planningofprogramme and preparation of soil investigation report.

UNITII
Slope Stability: Infinite and finite earth slopes in sand and clay, types of failures, factor of safety of infinite slopes, stability analysis by Swedish arcmethod, standard method of slices ,Taylor's Stability Number, Stability of slopes of dams and embankments – different conditions.
Earth-Pressure theories: Rankine's& Coulomb's theoryofearthpressure,Culmann's graphical method, earth pressures in layered soils.

UNITIII
Shallow Foundations – Bearing Capacity Criteria:Typesoffoundationsandfactors to be considered in their location , Bearing capacity –criteriafordetermination of bearing capacity – factors influencing bearing capacity, analytical methods to determine bearing capacity– Terzaghi's theory ,IS Methods.

UNITIV
Shallow Foundations – Settlement Criteria: Safe bearing pressure based onN- value, allowable bearing pressure; safe bearing capacity andsettlement from plate load test – Types of foundation settlements and their determination - allowable settlements of structures.

UNITV
Deep Foundations: Pile foundation, Types of piles, Load carrying capacity of piles based on static pile formulae, Dynamic pile formulae, Pile load tests, Load carrying capacity of pile groups in sands and clays.

Well Foundations: Types,Differentshapesofwell,Componentsofwell– functions, forces acting on well foundations, Design Criteria –Determinationof stainingthicknessandplug-constructionandSinkingofwells,Tiltandshift.

TextBooks:

1. Principles of Foundation Engineering, Das, B.M., (2011), 6th edition Cengage learning.
2. Basic and Applied Soil Mechanics, Gopal Ranjan& A.S.R. Rao, New Age International Pvt. Ltd, (2004).
3. SoilMechanicsandFoundations,B.C.Punmia,LaxmiPublictions.

References:

1. Foundation Analysis and Design, Bowles, J.E., McGraw-Hill Publishing Company, Newyork.
2. Theory and Practice of Foundation Design, N.N.SOM& S.C.DAS PHI Learning Private limited.

Sem	VISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET19
Name ofthe Course	ENVIRONMENTALENGINEERING					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthiscourse,thestudentswillbeableto:

- Clarifytheprotectedwatersupplysystemsandtheirimportance(K2)
- Assessdifferentsourcesofwaterandproperintakestructures(K3)
- Select suitable primary treatment process based on the quality ofraw water(K3)
- Selectsuitablesecondarytreatmentprocess(K3)
- Employproperdistributionsystem(K3)

UNITI

Protected Water Supply systems: Importance and Necessity, Water borne diseases, Flow chart of public water supply system, Role of Environmental Engineer,Agencyactivities.WaterDemandandQuantityEstimation:Estimation of water demand for a town or city, Per capita Demand and factors influencing it - Types of water demands and its variations- factors affectingwater demand, Design Period, Factors affecting the Design period, Population Forecasting

UNITII

Sources of Water: Lakes, Rivers, Impounding Reservoirs, comparison of sources with reference to quality, quantity and other considerations- Capacity of storage reservoirs, Mass curve analysis. Groundwater sources of water: Types of water bearingformations,springs,WellsandInfiltrationgalleries,Yields from infiltration galleries. Collection and Conveyance of Water: Factors governing the selection of the intake structure, Types of Intakes. Conveyance of Water: Gravity and Pressure conduits.

UNITIII

Quality Analysis and Primary Treatment of Water: Characteristics of water– Physical, Chemical and Biological- Analysis of Water – Physical, Chemical and Biological characteristics.

Flowchart of water treatment plant, Primary Treatment methods - Theory and Design of Sedimentation, Coagulation, Sedimentation with Coagulation

UNITIV

SecondaryTreatmentofWater: Filtration – types of filters – Design and working principles; Theory of disinfection-Chlorination and other Disinfection methods, Softening of Water, Removal of color and odours- Iron and Manganese removal –

Adsorption-fluoridation and deflouridation–aeration– Reverse Osmosis-Iron exchange–Ultra filtration.

UNITV

DistributionofWater: Requirements- Methods of Distribution system, Layouts of Distribution networks, Pressures in the distribution layouts, Analysis of Distribution networks: Hardy Cross and equivalent pipe methods -Components of Distribution system: valves such as sluice valves, air valves, scourvalvesand check valves, hydrants, water meters and Pipes –Laying and testing of pipe lines-selection of pipe materials, pipe joints.

TextBooks:

1. Elements of Environmental Engineering by K.N. Duggal, S. Chand Company Ltd., New Delhi, 2012.
2. Water Supply Engineering by Dr. P.N. Modi, Standard book house, 4th edition (2015)
3. WaterSupplyEngineeringbyB.C.Punmia,Laxmipublications,volume-I
4. Water supply and sanitary engineering by S. C. Rangwala, Charotar publishing house, 29th edition (2016)

References:

1. Water supply engineering byS. K. Garg , Khanna publishers, ,33rd edition (2010)
2. EnvironmentalEngineeringbyHoward S.Peavy,DonaldR. Rowe(2017)Mc-Graw-Hill Book Company, New Delhi, 1985.
3. IS10500:2012,Drinkingwaterspecification.
4. IS: 3052 (Part-08),Methods of samplingandTest (physicaland chemical)for water and wastewater.

Sem	VISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET20
Name ofthe Course	BRIDGEENGINEERING(ProfessionalElective-II)					
Branch	CIVILENGINEERING					

CourseOutcomes:
Uponsuccessfulcompletionthecoursethestudentwillbeableto

- Generalizedifferenttypesofbridges,loadingstandardsandend conditions (K2)
- AssessdifferentreactionsandmomentsintheTbeambridge(K3)
- Designofpierandabutmentcapsofbridges(K5)
- Designofwellfoundationwithdifferentparametersofsubsoil(K5)
- Outlinetheeffectivenessofdifferentbearingsofabridge(K4)

UNITI
Introduction: Bridges- Types- Slab bridges, T Beam, Arch bridges, Cable Stayed bridges, prestressed concrete bridges, Truss Bridges, Culverts, - Nomenclature- Selection of Bridge Site- Economical span- Abutments pier and end connections- types of foundations- Open, Pile, Well Foundations, Bearings – Types- Introduction to Loading standards- Railway and IRC Loading

UNITII
T-Beam Bridge: Pigeaud's method for computation of slab moments; Courbon's method for computation of moments ingirders;DesignofsimplysupportedT- beam bridge.

UNITIII
Sub Structure for Bridges: Pier and abutment caps; Materials for piers and abutments, Design of pier; Design of abutment; Backfill behind abutment;approach slab.

UNITIV
Foundations for Bridges: scour at abutments and piers; Grip length; Types of foundations; Design of well foundation.
BoxCulverts: Loading–AnalysisandDesign-Reinforcementdetailing

UNITV
Bearings for Bridges: Importance of bearings;bearingsforslabbridge;bearings for girder bridges; Expansion bearings; Fixed bearings; Design of elastomeric pad bearing.

TextBooks:

1. Essentials of Bridge Engineering by Dr.Johnson Victor; Oxford& IBHpublishing Co. Pvt.Ltd
2. Cablesupportedbridges, concepts and design by N J Gimsing. John Willey and Sons

3. DesignofBridges,N.KrishnaRaju,TataMcGrawHill

References:

1. DesignofBridgeStructuresbyT.RJagadeesh,M.AJayaram,PrenticeHall of India Pvt. Ltd.
2. DesignofConcreteBridges,Aswini,Vazirani, Ratwani
3. BridgeEngineeringbyS.Ponnuswamy

Sem	VIISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET21
Name ofthe Course	EARTHRETAININGSTRUCTURES (ProfessionalElective–II)					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthiscourse,thestudentswillbeableto

- Compute the lateral earth pressures associated with different earth systems (K3)
- Assessthefailurecriterionandstabilityrequirementsofretainingwall(K3)
- Analyzethesheetpilestructureforbothexternalandinternalstability(K4)
- Applythe knowledge ofreinforced earth in designing earth retaining systems (K3)
- Relatedifferentmethodsforthestabilityofbracedcutsandcofferdams(K3)

SYLLABUS

UNIT I

Earth pressures: Different types and their coefficients; ClassicalTheoriesof Earth pressure – Rankine's and Coulomb's Theories for Active and Passive earth pressure; Computation of Lateral Earth Pressure in Homogeneous and Layered soils; Graphical solutions for Coulomb's Theory in active and passive conditions.

UNITII

Retaining walls: Types, Type ofFailuresofRetainingWalls–Stability requirements – Drainage behindRetainingwalls–ProvisionofJoints–Relief Shells.

UNITIII

Sheet Pile Structures: Types of Sheet piles – Cantilever sheet piles in sands and clays – Anchored sheet piles – Free earth and Fixed earth support methods – Rowe's moment reduction method – Location of anchors and Design of Anchorage system.

UNITIV

Soil reinforcement: Reinforced earth - Different components – their functions – Design principles of reinforced earth retaining walls.

UNITV

Braced cuts and Cofferdams: Lateral Pressure in Braced cuts – Design of Various Components of a Braced cut – Stability of Braced cuts – Bottom Heave in cuts. – Types of cofferdam, suitability, merits and demerits – Design of single – wall cofferdams and their stability aspects – TVA method and Cummins' methods.

TextBooks:

1. PrinciplesofFoundationEngineeringby BrajaMDas,Cengage Learning
2. FoundationanalysisanddesignbyBowles,J.E.,McGrawHill
3. SoilMechanics inEngineeringPractice–Terzaghi, KandRalphB.Peck, John Wile & Sons.

References:

1. Earth Pressure and Earth Retaining Structures by Chris RI Clayton, Rick I woods, Andrew JBond and Jarbas Milititsky, CRC Press, Taylor and Francis Group, New York.
2. Analysis and Design of Foundations and Retaining Structures, Samsher Prakash
3. GopalRanjanandSwamiSaran,SarithaPrakashanPublishers,NewDelhi.
4. NPTELcourse materialson Geo-syntheticsand EarthRetainingStructures

Sem	VISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET22
Name of the Course	URBANHYDROLOGY&HYDRAULICS (ProfessionalElective–II)					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthiscourse,thestudentswillbeableto

- Develop the drainage systems corresponding to the trends inurbanization (K3)
- Assesstheurbandrainageflowpattern(K3)
- Selectsuitableelementsofdrainagesystem(K3)
- Relatethedetentionandretentionfacilitiesofstormwater(K3)
- Preparetypicaldrainagemasterplanforanurbanizedarea(K3)

SYLLABUS

UNIT I

Introduction: Urbanization and its effect on water cycle – urban hydrologic cycle – Trends in urbanization – Effect of urbanization on hydrology

Precipitation Analysis: Importance of short duration of rainfall and runoff data, methods of estimation of time of concentrationfordesignofurbandrainage systems, design storms for urban drainage systems.

UNITII

Approaches to urban drainage: Time of concentration, peak flow estimation approaches, rational method, NRCS curve number approach, runoff quantity and quality, wastewater and storm water reuse, major and minor systems.

UNITIII

Elements of drainage systems: Open channel, underground drains, appurtenances, pumping, source control.

UNITIV

AnalysisandManagement: Stormwaterdrainagestructures,designofstorm water network- Best Management Practices–detention and retention facilities, swales,constructedwetlands,modelsavailableforstormwatermanagement.

UNITV

Master drainage plans: Issues to be concentrated upon – typical urban drainagemaster plan, interrelation between waterresourcesinvestigationandurban planningprocesses,planningobjectives,comprehensiveplanning,useofmodelsin planning.

TextBooks:

1. ManualonDrainageinUrbanisedarea,GeigerW.F.,JMarsalek,W.J.Rawls and F.C. Zuidema, (1987 - 2 volumes), UNESCO,
2. UrbanHydrology,HallMJ(1984), ElsevierAppliedSciencePublisher.
3. Hydrology–QuantityandQualityAnalysis,WanielistaMPandEaglin(1997), Wiley and Sons

4. Urban Hydrology, Hydraulics and Storm water Quality: Engineering Applications and Computer Modelling, Akan A.O and R.L. Houghtalen (2006), Wiley International.

References:

1. StormwaterDetentionforDrainage,StahrePandUrbonasB(1990),Water Quality and CSO Management, Prentice Hall.
2. Urban water cycle processes and interactions, Marsalek et. al. (2006), PublicationNo.78,UNESCO,Paris(http://www.bvsde.paho.org/bvsacd/cd63/149460E.pdf)
3. FrontiersinUrban WaterManagement –Deadlock orHope, byMaksimovicC and J A Tejada-Guibert (2001), IWA Publishing

Sem	VISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET23
Name ofthe Course	PAVEMENTANALYSISANDDESIGN (ProfessionalElective–II)					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- Employdifferentfactorsinfluencingtheflexiblepavementdesign(K3)
- Employdifferentfactorsinfluencingtherigidpavementdesign(K3)
- Analyze stresses and strains in flexible and rigid pavement using different theories (K3)
- DesignaflexiblepavementusingAsphaltInstitute,andAASHTOmethods (K5)
- DesignarigidpavementusingAASHTOmethods(K5)

SYLLABUS

UNIT I

Factors Affecting Flexible Pavement Design: Variables Considered in Pavement Design, Types of Pavements, Functions of Individual Layers, EAL and ESWL Concepts, Traffic Analysis: ADT, AADT, Truck Factor, Growth Factor, Lane Distributions & Vehicle Damage Factors, Effect of Transient & Moving Loads.

UNITII

Factors Affecting Rigid Pavement Design: Rigid pavement layers**,**Classification ofAxleTypesofRigidChassisandArticulatedCommercialVehicles,LegalAxle and Gross Weights on Single and Multiple Units, Tire Pressure, Contact Pressure,

UNITIII

StressesinFlexibleandRigidPavement: Visco-ElasticTheoryand Assumptions, Layered Systems Concepts, Stress Solutions for One, Two and Three Layered Systems, Fundamental Design Concepts, Westergaard's Theory and Assumptions, Stresses due to Curling, Stresses and Deflections due to Loading, Frictional Stresses, and Stresses in Dowel Bars& Tie Bars

UNITIV

Design of Flexible Pavements: Factors effecting Design. Deflection studies in Flexible Pavements. Present Serviceability Index, Pavement Performance and methods- AASHTO and Asphalt Institute Method.

UNITV

Design of Rigid Pavements: FactorseffectingDesign–Wheelload&its repetition, subgrade strength& proportion, strength of concrete-modulusof elasticity,Reinforcementinslab,Designofjoints.DesignofDowelbars,Designof Tie bars. AASHTO methods of Rigid Pavement design.

TextBooks:

1. Principles of Pavement Design, Yoder.J.&Witzorac Mathew, W. John Wiley& Sons Inc
2. PavementAnalysis&Design,YangH.Huang,PrenticeHallInc.

3. AASHTOPavementDesignGuide(1993)

References:

1. DesignofFunctionalPavements,NaiC.Yang,McGrawHillPublications
2. ConcretePavements,AF Stock,Elsevier,AppliedSciencePublishers.
3. Pavement and Surfacing for Highway& Airports, Micheal Sargious, Applied Science Publishers Limited.
4. IRC:37&58CodesforFlexibleandRigidPavementsDesign.

Sem	VISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET24
Name ofthe Course	REMOTESENSINGANDGEOGRAPHICAL INFORMATIONSYSTEM(ProfessionalElective–II)					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- GeneralizethebasicprinciplesofRemoteSensingandGIS, including ground, air and satellitebased sensor platforms (K2)
- Interprettheaerialphotographsandsatelliteimageries(K2)
- Relatetheprocessofdataentryandpreparation(K3)
- ExaminetheSpatialDataforavarietyofapplications(K3)
- EmployRSandGISfordiverseapplications (K3)

SYLLABUS

UNIT I

Introduction to Remote Sensing: Basic conceptsofremotesensing,electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces,Characteristicsofremotesensingsystems.

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, space borne remote sensing, image data characteristics, digital image dataformats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT, MODIS, ASTER,RISAT and CARTOSAT.

UNITII

Image analysis: Introduction, elements of visual interpretations, digital image processing- image preprocessing, image enhancement, image classification, supervised classification, unsupervised classification.

UNITIII

GeographicInformationSystem: Introduction, key components, application areas of GIS, map projections.

Data entry and preparation: spatialdatainput,rasterdatamodels,vectordata models.

UNITIV

Spatial data analysis: Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing and buffer analysis.

UNITV

RS and GIS Applications: Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications.

Applications of Hydrology, Water Resources and Disaster Management: Food zoning and mapping, groundwater prospects and potential recharge zones, watershed management and disaster management with case studies.

TextBooks:

1. "RemotesensingandGIS",Bhatta,B.,OxfordUniversityPress,2008.
2. "RemoteSensingandGeographicalInformationSystems",AnjiReddy,M., B S Publications, 2008.
3. "BasicsofRemoteSensingandGIS"Kumar.S.,LaxmiPublications,

References:

1. "FundamentalsofRemoteSensing",GeorgeJoseph,UniversitiesPress, 2013.
2. "Concepts and Techniques of Geographical Information System", Chor Pang Lo and Yeung, A.K.W., Prentice Hall, India, 2006.
3. "RemoteSensinganditsApplications",NarayanL.R.A,UniversitiesPress, 2012.
4. "IntroductiontoGeographicInformationSystems",KandTsungChang, McGraw Hill Higher Education, 2009.
5. "Basics of Remote sensing& GIS", Kumar, S., Laxmi Publications, NewDelhi, 2005.
6. "PrincipalsofGeographicalInformationSystems", Burrough, P.A and McDonnell, R.A. Oxford University Press, 1998.
7. "RemoteSensing",Schowenger,R.A.,Elsevierpublishers,2006.
8. "Remote Sensing and ImageInterpretation", Lillesand, T.M, Kiefer, R.W. and Chipman, J.W., Wiley India Pvt. Ltd., New Delhi, 2013.
9. "Fundamentals of Geographic Information Systems", Demers, M.N, Wiley India Pvt. Ltd, 2013

Sem	VISem	L	T	P	C	COURSECODE
Regulation	V20	0	0	3	1.5	V20CEL09
Name ofthe Course	ENVIRONMENTALENGINEERINGLAB					
Branch	CIVILENGINEERING					

Courseoutcomes:

Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- Illustratethecharacteristicsofwaterandwastewater(K3)
- Predicttheportabilityofwater(K3)
- Examinetheconditionofwaterbasedonthetestedparameters(K3)
- Determinethedissolvedoxygen,BODandCODofwater(K4)

ListofExperiments:

1. Samplingofwaterfortesting(Demonstration)
2. Determinationofalkalinityoracidity
3. Determinationofchloridesinwaterandsoil
4. Determinationandestimationof total solids,organicandinorganicsolids, settle able solids
5. DeterminationofIron
6. DeterminationofpHandElectricalConductivityofwaterandsoil
7. DeterminationofOptimumcoagulantdose
8. DeterminationofChlorinedemand
9. Determinationandestimationoftotalhardness–calciumandmagnesium
10. Determinationof N,P,Kvaluesinsolidwaste
11. Physicalparameters–Temperature,colour,odour,turbidity,taste.
12. PresumptiveColiformtest
13. Determination ofDissolved OxygenandBOD
14. DeterminationofCOD

ListofEquipments:

1. pHMeter
2. TurbidityMeter
3. ConductivityMeter
4. HotAirOven
5. MuffleFurnace
6. DissolvedOxygenMeter
7. U-VVisibleSpectrophotometer
8. CODRefluxApparatus
9. JarTestApparatus
10. BODIncubator
11. Autoclave
12. HazensApparatus
13. ImhoffCone

References:

1. “Standardmethodsforanalysisofwaterandwastewater”,APHA.
2. “Chemical analysis of water and soil”, Murali Krishna, KVSG., Reem publications, New Delhi.

Sem	VISem	L	T	P	C	COURSECODE
Regulation	V20	0	0	3	1.5	V20CEL10
Name ofthe Course	CAD&GISLAB					
Branch	CIVILENGINEERING					

Course Outcomes:

Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- Design2Dand3Dframesusing STAADPRO(K3)
- Designtheretainingwallandsimpletowersusing STAADPRO(K3)
- Createthematicmapswithrelevantfeatures(K5)
- DevelopdigitalelevationmodelsusingGISsoftware(K3)

Note: Conductany10experiments,5eachfromCADDsoftwareandGISsoftware.

COMPUTERAIDEDDESIGNANDDRAWINGSOFTWARE:

- STAADPRO
- STRAAP
- STUDDS

ListOfExperiments

- 2-DFrameAnalysisandDesign
- SteelTabularTrussAnalysisandDesign
- 3-DFrameAnalysisandDesign
- RetainingWallAnalysis andDesign
- SimpleTowerAnalysisandDesign.
- Analysisofbeamwithdifferentendconditions
- Analysisofmultistoriedbuildingdesign
- Analysisofspace stress
- Wind analysisoftallstructure
- Analysisanddesignofelevatedwatertank

GEOGRAPHICALINFORMATIONSYSTEMSOFTWARE:

- ArcGIS9.0
- ERDAS8.7
- Mapinfo6.5

ListOfExperiments

- Georeferencing-toposheet
- Georeferencing-satelliteimage
- Creatingalayerstack
- Extractingfeatures-digitizing
- Maplayoutandanalysis
- Rastersupervisedclassification
- Rasterunsupervisedclassification
- RasterAnalysis-UrbanDevelopment
- RasterAnalysis-Waterbodies

- Creationofthematicmaps.
- Estimationoffeaturesandinterpretation
- VectorAnalysis–Route Map
- VectorAnalysis–village/place/pointidentification
- CreationofDEM(DigitalElevationModel)

References:

1. Computer aided design lab (Civil) Engineering by shesha Prakash andsuresh S.
2. Concept and Techniques of GIS' by C.P.L.O. Albert, K.W. Yong, Printice Hall Publishers.

Sem	VISem	L	T	P	C	COURSECODE
Regulation	V20	0	0	3	1.5	V20CEL11
Nameofthe Course	ESTIMATION,CONTRACTS&CONSTRUCTION MANAGEMENTLAB					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- Estimatethequantitiesofdifferentitemsofconstructionwork(K2)
- Analyzethecostofdifferentitemsofconstructionwork(K3)
- Computethequantitiesforearthworkofroads,canals(K3)
- Relatethespecificationofdifferent worksandmakecontract documents (K3)
- Employdifferenttechniquesintheprocessofconstruction planning and management (K3)

ListofWorkPractices

- Estimation of building using Individual Wall Method (two or more rooms)
- EstimationofbuildingusingCenterLineMethod(twoormorerooms)
- Schedule ofbarbendingforbeamsandslab
- Earthworkestimationusingdifferentmethods
  - Mid-sectional area method,
  - Meansectionalareamethod,
  - Trapezoidal rule,
  - Prismoidalrule
- Valuationofvariousitemsofwork
- PreparationofContractDocument
- ProjectNetworkTechniques
  - BarChart
  - Programme EvaluationandReviewTechnique
  - Critical Path Method
- DetailedstudyonEarthWork,Hoisting andConcretingEquipment's

References:

1. "EstimatingandCosting"byB.N.Dutta,UBSpublishers,2000.
2. "EstimatingandCosting"byG.S.Birdie.
3. "Method of Measurement of Building& Civil EnggWorks–IS1200 (Parts I to XXV-1974) "Estimation, Costing and Specifications" by M.Chakraborthi, Laxmi Publications.

Sem	VISem	L	T	P	C	COURSECODE
Regulation	V20	2	0	0	0	V20CEMC01
Name ofthe Course	INTELLECTUALPROPERTYRIGHTS&PATENTS					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- DescribetheneedofIntellectualPropertyRights(K2)
- GeneralizedifferentissuesregardingCopyRights(K2)
- EmploytheprocedureforPatentregistrationandgranting(K3)
- DiscusstheimportanceofTrademarkanditsrelatedissues(K2)
- RecognizethesignificanceofTradeSecretsinIndustry(K2)

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SYLLABUS

UNITI

Introduction to Intellectual Property Rights (IPR): Introduction to IPR, Evolutionary Past, Concept of IPR – Purpose of IPR, Types of IPR, WIPO -TRIPS, Nature of IPR, Patents, Trademarks, Copyrights, Neighboring Rights, Agencies responsible for IPR - Infringement, Use and Misuse of Intellectual Property Rights.

UNITII

Copyrights: Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights - Copyright Ownership – Transfer and Duration – Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Semiconductor Chip Protection Act.

UNITIII

Patents: Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent-PatentRegistrationandGranting of Patent -Exclusive Rights – Limitations - Ownership and Transfer –– Revocation of Patent – Patent Appellate Board-InfringementofPatent– CompulsoryLicensing– SoftwareProtectionand ComputerrelatedInnovations.

UNITIV

Trademarks: Introduction to Trademarks – Laws Relating toTrademarks– Functions of Trademark – – Trade Mark Registration – Trade Mark Maintenance – Transfer of rights – Deceptive Similarities - Likelihood of Confusion - Dilution of Ownership – TrademarksClaimsandInfringement–Remedies–PassingOff Action.

UNITV

TradeSecrets: IntroductiontoTradeSecrets–GeneralPrinciples-LawsRelating to Trade Secrets - Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreements – Breach of Contract –Law of

UnfairCompetition–TradeSecretLitigation–ApplyingStateLaw,CyberLawand Cyber Crime

TextBooks:

1. Intellectual PropertyRights(Patents& CyberLaw),Dr. A.Srinivas. Oxford University Press, New Delhi.
2. PrabhuddhaGanguli: Intellectual Property Rights, Tata Mc-Graw –Hill, New Delhi
3. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.

References:

1. DeborahE.Bouchoux:IntellectualProperty,CengageLearning,New Delhi.
2. RichardStim:IntellectualProperty,CengageLearning,NewDelhi.
3. KompalBansal&ParishitBansalFundamentalsofIPRforEngineers, B.S.Publications(Press).
4. CyberLaw-Texts&Cases,South-Western'sSpecialTopicsCollections.
5. M.Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, Serials Pub.

VIISEMESTER–SYLLABUS

Sem	VIISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET25
Nameofthe Course	PRESTRESSEDCONCRETE(ProfessionalElective–III)					
Branch	CIVILENGINEERING					

COURSEOUTCOMES:

Uponthesuccessfulcompletionofcoursestudentswillbeableto

- Discussthebasicconceptsofprestressingsystem(K2)
- Analyzetheeffectiveprestressandbendingstresses(K4)
- Analyze thedeflectionsandflexuralstrengthofprestressedconcretebeams (K4)
- AnalyzetheprestressedconcretebeamsunderShearandtorsion(K4)
- Designtheendzoneofprestressedconcretemembers(K5)

UNITI

Introduction: Basic concepts of prestressing; Need for High strength steel and High strength concrete. Terminology; Advantages and Applications of Prestressed Concretes, Materialsfor prestressedConcrete:Highstrengthconcrete;High tensile steel.

Prestressing Systems: Prestressing Systems- Introduction, Tensioning devices, Pre-tensioning Systems, Post tensioning Systems

UNITII

Analysis of Prestress and Bending Stresses: Basic assumptions; Analysis of prestress; Resultant stresses at a section; Pressure (Thrust) line and internal resisting couple; Concept of Load balancing.

LossesofPrestress: Natureoflossesofprestress;Lossduetoelasticdeformation of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip; Total losses allowed for in design.

UNITIII

Deflections of Prestressed Concrete Members: Importance ofcontrolofdeflections; Factors influencing deflections; Short term deflections of un-cracked members; Effect of tendon profile on deflections.

Limit State of Collapse: Flexural Strength of Prestressed Concrete Sections: Ultimate flexural strength of rectangular sections and T-sections using simplifiedIS code recommendations.

UNITIV

Limit State of Collapse: Shear Resistance of Prestressed Concrete Members: Shear and principal stresses; Shear- IS Code recommendations: Ultimate shear resistance of prestressed concrete members; Design of shear reinforcement.

Torsional Resistance of PrestressedConcreteMembers: Designofreinforcements for torsion, shear and bending.

UNITV

Design of End Blocks: Transmission of prestress in pretensioned members; Transmission length; Anchorage stress in post tensioned members; Bearing stress andburstingtensileforcestressesinendblocks-Methods.ISCodeprovisionfor the design of end block reinforcement.

TextBooks:(supplementedwithIS:1343)

1. Prestressed Concrete by N. Krishna Raju; Tata Mc.Graw - Hill Publishing Company Limited, New Delhi.
2. Pre-stressedConcrete-P.Dayarathnam:OxfordandIBHPublishingCo.
3. PrestressedConcrete,S.Ramamrutham

References:

1. PrestressedconcretebyN.Rajagopalan;NarosaPublishingHouse.
2. Design of pre-stressedconcretestructures-T.Y.Linand NedH.Burns-John Wiley & Sons, New York.
3. Fundamentalofpre-stressedconcrete-N.C.Sinha&S.K.Roy
4. PrestressedConcrete,T.Y.Lin&Burns,WileyPublications

Sem	VIISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET26
Name ofthe Course	ADVANCEDFOUNDATIONENGINEERING (ProfessionalElective–III)					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthiscourse,thestudentwillbeableto

- Illustratethesafebearingcapacityandsettlementoffootingssubjectedto different types of loading (K3)
- Employsuitabletechniquesforproportioningthefoundationslaidon different soils strata (K3)
- Assess the forces acting on Earth Retaining Structures using different earth pressure theories (K3)
- Predicttheloadcarryingcapacity, pull-outcapacity,negativeskinfriction of piles and their settlements (K3)
- Interpretdifferentfoundationpracticesinexpansivesoils(K3)

SYLLABUS

UNIT I

Bearing capacity of Foundation: using general bearing capacity equation– Meyerhof's, Brinch Hansen's and Vesic's methods-Bearing capacity of Layered Soils: Strong layer over weak layer, Weak layer on strong layer.

Settlement analysis: Immediate settlement, consolidate settlement, corrections, settlement of footings resting on granular soils and clay soils – Schmertmann& Hartman method – Janbu's method.

UNITII

Mat foundations: Purpose and types of isolated andcombinedfootings–Mats/Rafts – Proportioning of footings – Ultimate bearing capacity ofmatfoundations – allowable bearing capacity of mats founded in claysandgranular soils– compensated rafts.

UNITIII

Earth-retaining structures:cantilever sheet piles –anchoredbulkheads–fixedand free earth support methods – designofanchors–bracedexcavations– functionofdifferentcomponents–forcesinties–stabilityagainstbottomheave.

UNITIV

Pile foundations: single pile versus group of piles – load-carrying capacity of pile groups–negativeskinfriction(NSF)-settlementofpilegroupsinsandsandclays – laterally loaded piles in granular soils – Reese and Matlock method – laterallyloadedpilesincohesivesoils–DavissonandGillmethod–Broms'analysis.

UNITV

Foundations in expansive soils:definitions of swell potentialandswelling pressure – determination of free swell index – factors affecting swell potential and swelling pressure – foundation practices – sand cushion method–CNSlayer- drilled piersand belledpiers–under-reamedpiles–moisturecontrol methods.

TextBooks:

1. PrinciplesofFoundationEngineering,BMDas,CENTAGLearning
2. SoilMechanicsandFoundationEngineering,VNSMurthy,CBSPublishers
3. Basic and applied soil mechanics by Gopal Ranjan and ASR Rao, New Age Publishers

References:

1. FoundationAnalysisandDesign,J.E.Bowles,JohnWiley
2. FoundationDesign,W.C.Teng,PrenticeHallPublishers
3. Analysis and Design of Foundations and Retaining Structures by Prakash S edited by Saritha Prakashan

Sem	VIISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET27
Nameofthe Course	GROUNDWATERDEVELOPMENT (ProfessionalElective–III)					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- Estimateaquiferparametersanditsyield(K2)
- Designthewellsanditsassociatedcomponents(K5)
- Generalizethewellconstruction,developmentanditsmaintenance (K3)
- Organize the process of artificial recharge for increasing ground waterpotential (K3)
- Interpret geophysicalexplorationdatafor aquifersand theirsources (K3)

SYLLABUS

UNIT I

Ground water and Well Hydraulics: Hydrologic Cycle -Groundwater in the hydrologic cycle, groundwater occurrence, aquifer parameters and their determination, general groundwater flow equation - Steady radial flow and unsteady radial flow to a well in confined and unconfined aquifers, Theis solution, Jocob and Chow's methods, Leaky aquifers.

UNITII

Well Design: Water well design-well diameter, well depth, well screen-screen length,slotsize,screendiameterandscreenselection,designofcollectorwells, infiltration gallery.

UNITIII

Well Construction and Development: Water wells, drilling methods-rotary drilling, percussion drilling, well construction-installation of well screens-pull-back method, open- hole, bail-down and wash-down methods, well development-mechanical surging using compressed air, high velocity jetting of water, over pumping and backwashing, well completion, well disinfection, well maintenance.

UNITIV

Artificial Recharge: Concept of artificial recharge of groundwater, recharge methods-basin, Stream-channel, ditch and furrow, flooding and recharge well methods, recharge mounds and induced recharge.

Saline Water Intrusion: Occurrence of saline water intrusion, Ghyben- Herzberg relation, Shape of interface, control of saline water intrusion.

UNITV

Geophysics: Surface methods of exploration of groundwater – Electrical resistivityand Seismic refraction methods, Sub-surface methods – Geophysical logging and resistivity logging, Aerial Photogrammetry applications.

TextBooks:

1. 'Groundwater'byRaghunathHM,NewAgeInternationalPublishers,2005.
2. 'GroundwaterHydrology'byToddD.K.,WileyIndiaPvtLtd.,2014.
3. 'GroundwaterHydrology'byToddDKandLWMays,CBSPublications,2005.

References:

1. 'Groundwater Assessment and Management' by Karanth K R, Tata Mc Graw Hill Publishing Co., 1987.
2. 'GroundwaterHydrology'byBouwerH,McGrawHillBookCompany,1978.
3. 'Groundwater Systems Planning and Management' by Willis R and W.W.G. Yeh, Prentice Hall Inc., 1986.
4. 'GroundwaterResources Evaluation'byWaltonWC,McGrawHill Book Company, 1978.

Sem	VIISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET28
Name ofthe Course	HIGHWAYCONSTRUCTIONANDMANAGEMENT (ProfessionalElective–III)					
Branch	CIVILENGINEERING					

CourseOutcomes:
Uponthesuccessfulcompletionofcoursestudentswillbeableto

- Employ techniques in the planning of Base, Subbase and Shoulders ofpavement (K2)
- Prepareamethodologyinthelayingofbituminouspavements(K3)
- RelatedifferentconceptsintheconstructionofCementConcretePavements (K3)
- PrepareaprocedureforthemaintenanceofCementConcretePavements(K3)
- DevelopproperPavementManagementSystems(K3)

SYLLABUS

UNIT I
Construction of Base, Subbase and Shoulders: Roadway and Drain Excavation, Excavation and Blasting, Embankment Construction, Construction of Gravel Base, Cement Stabilized Sub- Bases, WBM Bases, Wet MixConstruction;Crushed Cement Bases, Shoulder Construction.

UNITII
Bituminous Construction: Preparation and Laying of Tack Coat; Bituminous Macadam, Penetration Macadam, Built up Spray Grout, Open Graded Premix, Mix Seal, Semi-Dense Asphalt Concrete-Interface Treatments and OverlayConstruction, IRC Specifications.

UNITIII
CementConcretepavementConstruction: CementConcretePavementAnalysis - Construction of Cement Roads, Manual, and Mechanical Methods, Joints in Concrete and Reinforced Concrete Pavement and Overlay Construction.

UNITIV
Bituminous and Cement Concrete pavement Maintenance: Repair of surface layer, Base layer, sub base layer, Sub grade, Maintenance of Concrete slab, DryLean concrete sub base layer and Subgrade in concrete pavement.

UNITV
Pavement Management Systems: Pavement Management Systems- Components, structure, data requirements, Project level and Network level needs, Pavement performance prediction – concepts, modelling techniques, Budget forecasting for maintenance and rehabilitation.

TextBooks:
1. Highway Engineering, Khanna S. K., Justo C. E. G and Veeraragavan A, Nem Chand Bros., Roorkee.

2. Ralph C.G. Haas, W. Ronald Hudson and Zanieswki "Modern Pavement Management", Mc Graw Hill and Co,1994
3. PrinciplesofHighwayEngineering,KadiyaliL.R,KhannaPublishers,New Delhi.
4. MORTH-Specifications.

References:

1. PrinciplesofTransportationEngineering,ParthaChakroborthyandAnimesh Das, PHI Learning Private Limited, Delhi.
2. Transportation Engineering - An Introduction, Jotin Khisty C, Prentice Hall, Englewood Cliffs, New Jersey.
3. Transportation Engineering and Planning, Papacostas C.S. and P.D. Prevedouros, Prentice Hall of India Pvt.Ltd; New Delhi.

Sem	VIISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET29
Name ofthe Course	ENVIRONMENTALIMPACTASSESSMENTAND MANAGEMENT(ProfessionalElective–III)					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthecourse,thestudentwillbeableto

- PreparedifferentreportsrelatedtoEMP,EIS,andEIA(K3)
- SelectanappropriateEIAmethodology(K2)
- AssesstheImpactofdevelopmentactivitiesandlanduse(K3)
- Employ in procuring the natural resources and assessment of Eco system (K3)
- DeveloptheEIAnotificationsandreports(K3)

SYLLABUS

UNIT I

Basic concept of EIA: Elements of EIA-factors affecting EIA-Initial environmental Examination-life cycle analysis preparation of Environmental Base map-Classification of environmental parameters role of stakeholders in the EIA preparation stages in EIA

UNITII

E I AMethodologies:introduction,CriteriafortheselectionofEIAMethodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Indexmethod,overlaymethods,cost/benefitAnalysis–EISand EMP

UNITIII

Impact of DevelopmentalActivitiesandLanduse: Introductionand Methodology for the assessment ofsoilandgroundwater,Delineationofstudy area,Identificationofactives-applicationofremotesensingandGISforEIA.

UNITIV

Procurementofnaturalresourcesandassessmentofecosystem: Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures- E I A with reference tosurface water, Air and Biological environment – wild life - deforestration

EnvironmentalRiskAssessmentand management: Risk assessment and treatment of uncertainty-key stages

UNITV

EIA notification: EIA notification by Ministry of Environment and Forest (Govt. of India): Provisions in the EIA notification, procedure for environmental clearance, andprocedureforconductingenvironmentalimpactassessmentreport-evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO 14000, Case studies and preparation of Environmental Impact assessment statement for various Industries.

TextBooks:

1. Environmental Impact Assessment, Canter LarryW., McGraw-Hill education Edi (1996)
2. EnvironmentalImpactAssessmentMethodologies,Y.Anjaneyulu,B. S. Publication, Sultan Bazar, Hyderabad.
3. EnvironmentalImpactAssessmentand Management,BBHosetti,A.Kumar, Daya Publishing House (2014)

References:

1. EnvironmentalScienceandEngineering,J.GlynnandGaryW.HeinKe PrenticeHall Publishers
2. EnvironmentalScienceandEngineering,SureshK.Dhaneja,S.K.,Katania& Sons Publication., New Delhi.
3. Environmental Pollution and Control, H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi

Sem	VIISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET30
Name ofthe Course	FINITEELEMENTMETHOD (ProfessionalElective–IV)					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthecourse,thestudentwillbeableto

- GeneralizetheconceptofFiniteElementMethod(K2)
- EmploydifferentformulationtechniquesofFEMtotheengineeringproblems (K3)
- Assessonedimensionalsolidelementsofvariouspracticalproblems(K3)
- Analyzedifferentcomponentsofframedstructure(K4)
- Analyzethetwoandthreedimensionalsolidsusing FEM(K4)

SYLLABUS

UNIT I

IntroductiontoFiniteElementAnalysis: BasicConceptsofFiniteElement Analysis-IntroductiontoElasticity-Stepsin FiniteElementAnalysis

UNITII

FiniteElementFormulationTechniques: VirtualWorkandVariationalPrinciple - Galerkin Method- Finite Element Method: Displacement Approach -Stiffness Matrix and Boundary Conditions

UNITIII

Element Properties: Natural Coordinates -Triangular Elements - Rectangular Elements - Lagrange and Serendipity Elements -Solid Elements - Isoparametric Formulation -Stiffness Matrix of Isoparametric Elements - Numerical Integration: One Dimensional - Numerical Integration: Two and Three Dimensional- Worked out Examples

UNITIV

Analysis of Frame Structures: Stiffness of Truss Members -Analysis of Truss - Stiffness of Beam Members - Finite Element Analysis of Continuous Beam -Plane Frame Analysis - Analysis of Grid and Space Frame

UNITV

FEM for Two and Three Dimensional Solids: Constant Strain Triangle - Linear StrainTriangle-RectangularElements-NumericalEvaluationofElement Stiffness - Computation of Stresses, Geometric Nonlinearity and Static Condensation - Axisymmetric Element - Finite Element Formulation of Axisymmetric Element - Finite Element Formulation for 3 Dimensional- Elements Worked out Examples

TextBooks:

1. IntroductiontoFiniteElements in Engineering, TirupatiR.Chandrupatla, Ashok D. Belgundu, PHI publications.
2. AfirstcourseintheFiniteElementMethod,DaryL.Logan,Thomson Publications.
3. TheFiniteElementMethod-Zinkiewicz,O.C.andTaylor,R.L,Oxford.
4. FiniteElement Analysis TheoryandProgramming-Krishnamoorthy, C.S, Tata McGraw-Hill Education.

References:

1. ConceptsandapplicationsofFiniteElementAnalysis,RobertD.Cook, Michael E Plesha, John Wiley & sons Publication .
2. IntroductiontoFiniteElementMethod,Desai&AbelCBSPublication.
3. Introduction to Finite Element Method- P.N. Godbole, I K InternationalPublishing House Pvt. Ltd.
4. The Finite Element Method in Engineering- S.S. Rao, Butterworth-Heinemann;
5. An Introduction to Finite Element Method- Reddy, J.N., McGraw-Hill Education

Sem	VIISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET31
Name of the Course	ENGINEERINGWITHGEO-SYNTHETICS (ProfessionalElective–IV)					
Branch	CIVILENGINEERING					

CourseOutcomes:
Uponsuccessfulcompletionofthiscourse,thestudentswillbeableto

- Relate the need and demand of geo-synthetic materials in the fieldofgeotechnical related works (K3)
- Applythegeotextilesandgeogridstopracticalproblems(K3)
- InterpretthefunctionsandapplicationsofGeomembranesand Geocomposites (K3)
- AssesstheinternalandexternalstabilityofReinforcedEarthRetainingWall (K3)
- Examinetheapplicationsofgeo-syntheticsinroadconstruction(K3)

SYLLABUS

UNIT I
Geosynthetics: Introduction to Geosynthetics – Basic description – Polymeric materials– Uses and Applications, Properties of Geotextiles – Geogrids – Geomembranes – Geocomposites.

UNIT-II
Geotextiles: Design criteria for Separation – Reinforcement – Stabilization– Filtration – Drainage and Moisture barriers.
Natural Geotextiles: Natural fibres as geotextiles- factors governing the use jute fibres-coir geotextiles-bamboo/timber-combination of geotextiles.
Geogrids: DesigningforReinforcement–Stabilization–DesigningGabions– Construction methods.

UNIT-III
Geomembranes: Pond Liners – Covers for Reservoirs – Canal Liners – LandfillLiners– Caps and closures, moisture barriers.
Geocomposites: An added advantage – Geocomposites in Separation – Reinforcement – Filtration – Geocomposites as Geowebs and Geocells.

UNIT-IV
ReinforcedEarthRetainingWalls: Components- External stability– Internal stability- Designofreinforcedearthwallswithstrip,sheetandgridreinforcement.

UNIT-V
UseofGeosynthetics inRoads:Geosyntheticsinroadways-applicationsrole of subgrade conditions-designcriteria-survivability-applicationin paved roads.

TextBooks:

1. Designing with Geosynthetics by Robert M. Koerner, Prantice Hall, Eaglewood Cliffs, NJ.
2. An Introduction to Soil Reinforcement and Geosynthetics' by G.L.Sivakumar Babu (2009), Universities Press (India) Pvt. Ltd.
3. Engineering with Geosynthetics', by G. Venkatappa Rao and GVSSuryanarayana Raju – Tata McGraw Hill Publishing CompanyLimited–New Delhi.

References:

1. 'ConstructionandGeotechnicalEngineeringusingSyntheticFabries'byRobert M.KoernerandJosophP.Welsh.JohnWilleyandSons,NewYork.
2. 'FoundationAnalysisandDesign'byJ.E.BowlesMcGrawHillPublications.

Sem	VIISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET32
Name ofthe Course	URBANTRANSPORTATIONPLANNING (ProfessionalElective–IV)					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthiscourse,thestudentswillbeableto

- EmploytheUrbanTransportationProblems&TravelDemand(K3)
- Relatethetechniquesinthedatacollectionforplanningthenetwork(K3)
- Developvariousmodelsfortripgeneration,tripdistributionandtraffic assignment (K3)
- Preparevariousalternativetransportationproposals(K3)
- Solvethetrafficassignmentfortransportnetwork(K5)

SYLLABUS

UNIT I

Urban Transportation Problems& Travel Demand: Urban Issues, Travel Characteristics, Evolution of Planning Process, Supply and Demand – Systems approach; Trends, Overall Planning process, Long term Vs Short term planning, Demand Function, Independent Variables, Travel Attributes, Assumptions in Demand Estimation, Sequential, and Simultaneous Approaches, Aggregate and Disaggregate Techniques.

UNITII

Data CollectionandInventories: Collection of data – Organisation of surveysandAnalysis,StudyArea,Zoning,TypesandSourcesof Data,RoadSide Interviews, Home Interview Surveys, Commercial Vehicle Surveys, Sampling Techniques, Expansion Factors, Accuracy Checks, Use of Secondary Sources, Economic data – Income – Population – Employment – Vehicle Owner Ship.

UNITIII

TripGeneration&Distribution:UTPSApproach, Trip GenerationAnalysis:Zonal Models, Category Analysis, Household Models, Trip Attraction models, Commercial Trip Rates; Trip Distribution: Growth Factor Methods,GravityModels, Opportunity Models, Time Function Iteration Models.

UNITIV

Mode Choice Analysis: Mode Choice Behaviour, Competing Modes, Mode Split Curves, Aggregate and Disaggregate Approaches; Discrete Choice Analysis, Choice sets, Maximum Utility, Probabilistic Models: Binary Logit, Multinomial Logit Model – IIA property; Aggregation

UNITV

Traffic Assignment: Diversion Curves; Basic Elements of Transport Networks, Coding, Route Properties, Path Building Criteria, Skimming Tree, All-or-Nothing Assignment, Capacity Restraint Techniques, Reallocation of Assigned Volumes, Equilibrium Assignment.

CorridorIdentification,PlanPreparation&Evaluation: Master plans, Selectionof Corridor, CorridorIdentification,CorridordeficiencyAnalysis;TravelForecasts to Evaluate Alternative Improvements, Impacts of New Development on TransportationFacilities.PivotPointAnalysis,EnvironmentalandEnergy Analysis; Case studies

TextBooks:

1. IntroductiontoUrbanSystemPlanning,Hutchinson,B.G.,McGrawHill.
2. TransportationEngineering-AnIntroduction,KhistyC.J.,PrenticeHall

References:

1. IntroductiontoTransportationPlanning,BrutonM.J.,HutchinsonofLondon.
2. FundamentalsofTransportationPlanning,Papacostas,TataMcGrawHill
3. UrbanTransportationPlanning:AdecisionorientedApproach,MayerMand Miller E, McGraw Hill
4. Traffic Engineering and Transportation Planning, Kadiyali.L.R., Khanna Publishers, New Delhi.
5. MetropolitanTransportationPlanning,Dicky,J.W.,TataMcGrawHill

Sem	VIISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET33
Name ofthe Course	SOLIDWASTE MANAGEMENT (ProfessionalElective–IV)					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthiscourse,thestudentswillbeableto

- Relate the factors influencing generation of solid waste anditsmanagement (K3)
- AssessthebasicelementsformanagingtheSolidWaste(K3)
- Developdifferentmethodsfortransportationandtransformationofsolidwaste (K3)
- Preparedifferentmethodsforprocessingandtreatment ofmunicipalsolid waste (K3)
- Findsuitabledisposalmethodswithrespecttosolidwaste(K3)

SYLLABUS

UNIT I

Introduction to Solid Waste Management: Goals and objectives of solid waste management, Classification of Solid Waste – Factors Influencinggenerationof solid waste – sampling and characterization –Future changes in wastecomposition, major legislation, monitoring responsibilities.

UNITII

Basic Elements In Solid Waste Management: Elements and their inter relationship – principles of solid waste management- onsite handling, storage and processing of solid waste Collection of Solid Waste: Types and methods of waste collectionsystems,analysisofcollectionsystem–optimizationofcollectionroutes.

UNITIII

Transportation and Transformation of Solid Waste: Need for transfer operation, compaction of solid waste – transport meansandmethods,transferstationtypesand design requirements.

Unit operations used for separation and transformation: shredding – materials separation and recovery, source reduction and waste minimization.

UNITIV

Processing and Treatment: Processing of solid waste – Waste transformation through

combustionandcomposting,anaerobicmethodsformaterialsrecoveryandtreatment– Energyrecovery–biogasgenerationandcleaning–Incinerators.

UNITV

Disposal of Solid Waste: Methods of Disposal, Landfills: Site selection, design and operation, drainage and leachate collection systems –designated waste landfill remediation.

TextBooks:

1. "IntegratedSolidWasteManagement",GeorgeTechobanoglous,McGrawHill Publication, 1993
2. "EnvironmentalEngineering",GerardKiely,McGrawHillPublication,2007
3. "EnvironmentalScienceandEngineering", JGlynnHenry,.GaryW.Heinke, Prentice-Hall of India Pvt Ltd, 1996

References:

1. "Solid Waste Engineering", Vesilind, P.A., Worrell, W., Reinhart, D., Cenage learning, New Delhi, 2004
2. "Hazardous Waste Management", Charles A. Wentz., McGraw Hill Publication, 1995.
3. "IntroductiontoEnvironmentalEngineering"MackenzieL Davis, David A.Cornwell, McGraw Hill Publication, 2017

Sem	VIISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET34
Name ofthe Course	PREFABIRCATEDSTURCTURES (ProfessionalElective–IV)					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- Relatetheprinciplesofprefabrication,productionanderection processes (K3)
- Practicedifferentwaystoutilizeprefabricatedcomponents(K3)
- Designtheprefabricatedcomponentstomountontheprecast concrete system (K5)
- Preparetypesofjointsandconnectionstoaccommodateinprecast system (K3)
- Use codal provisions to avoid progressive collapse to abnormal loads (K3)

SYLLABUS

UNIT I

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

UNITII

PrefabricatedComponents:Behaviorandtypesofstructuralcomponents –Large panel systems – roof and floor slabs – Walls panels- Beams- Columns - Shear walls

UNITIII

DesignPrinciples: Designphilosophy-Designofcrosssectionbasedonefficiency of material used – Problems in design because ofjointflexibility–Allowancefor joint deformation - Demountable precast concrete systems.

UNITIV

Joints and Connections in Structural Members: Types of Joints – based onaction of forces - compression joints - shear joints - tension joints - based on function - construction, contraction, expansion, Design of expansion joints - Dimensions and detailing - Types of sealants - Types of structural connections - BeamtoColumn-ColumntoColumn- BeamtoBeam-Columntofoundation.

UNITV

Design for Abnormal Loads: Progressivecollapse– Codalprovisions– Equivalent designloadsforconsideringabnormaleffectssuchasearthquakes,cyclones,etc., -Importanceofavoidanceofprogressivecollapse.

TextBooks:

1. "Prefabrication with Concrete", Bruggeling A.S. G and Huyghe G.F., A.A. Balkema Publishers, USA,1991.
2. "PrecastConcrete-Materials,Manufacture, Properties AndUsage", Lewitt,M., Applied Science Publishers, London and New Jersey, 1982.
3. "Precast Concrete Structures", Bachmann, H. and Steinle, A., Ernst&Sohn,Berlin, 2011.

References:

1. "Manual of precast concrete construction", Koncz T., Vol. I, II and III, Bauverlag, GMBH, 1976.
2. "HandbookonPrecast ConcreteBuildings", Indian Concrete Institute,2016.
3. "Structural design manual", Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland BetorVerlag, 2009

Sem	VIISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET35
Nameofthe Course	EARTHQUAKEENGINEERING (ProfessionalElective–V)					
Branch	CIVILENGINEERING					

CourseOutcomes

Atthe endofthecoursethe studentwill beable to

- Discussthe basicconcept andcharacteristicsof earthquakes(K2)
- Examinethegroundmotionandseismichazard(K3)
- Assessthefrequencyofwavepropagationindifferentmediums(K3)
- Illustratethebehaviorandresistiveforcesgeneratedinthestructure during earthquake (K3)
- Relate the possibility of liquefaction and ground improvement for remediation of seismic hazards (K3)

SYLLABUS

UNIT I

IntroductiontoDynamicLoads: StaticLoadv/sDynamicLoad,Typesof Dynamicforces,ForceControlandDisplacementControl.

Seismology and Earthquakes: Introduction, Seismic Hazards, seismicwaves, internal structure of earth, Continental driftandplatetectonics,faults, elastics rebound theory, geometric notations, location of earthquakes, size of earthquakes.

UNITII

StrongGroundMotion: Strong ground motion measurement, ground motion parameters, estimation of ground motion parameters.

Seismic Hazard Analysis: Identification and Evaluation of Earthquake Sources, deterministic seismic hazard analysis, probabilistic seismic hazard analysis.

UNITIII

WavePropagation: Wavesinunboundedmedia,wavesinasemi–infinitebody,wavesinalayeredmedia,attenuationofstresswaves.

Artificial Ground Motion Generation: Modification of actual ground motion records, time –domain generation, frequency domain generation.

UNITIV

Behavior of Structures: During Earthquake and Earthquake Resistant Features of Structure Inertia forces in structures, Behavior of Masonry Structures, Behavior of RC Structures

UNITV

Liquefaction: Flow liquefaction, cyclic mobility, evaluation of liquefaction hazards, liquefaction susceptibility, initiation of liquefaction, effects of liquefaction.

Soil Improvement for Remediation of Seismic Hazards: Densification techniques, Reinforcement Techniques, Grouting and Mixing techniques, Drainage techniques.

TextBooks:

1. EarthquakeResistantDesignofStructuresByPankajAgarwal& Manish Shrikhande, PHI Publications
2. S.K.Duggal;EarthquakeResistanceDesignofStructures;Oxford University Press, New Delhi.
3. K.Chopra;DynamicsofStructures,Pearson,NewDelhi
4. Park&Pauly;BehaviorofR.CStructures
5. Geotechnical Earthquake Engineering by Steven L. Kramer, prentice Hall

ReferenceBooks:

1. IS:1893(Part-I)2002,CriteriaforEarthquakeResistantDesign General Provision to Building.
2. S:13920(1993), CodeofPracticeforDuctileDetailingofRC Structures
3. IS: 4326 (1993), Code of Practice for Earthquake Resistant Design and Construction of Buildings
4. IS: 13827 (1993),ImprovingEarthquake Resistance of Earthen Buildings
5. IS: 13828 (1993), Guide lines for Improving Earthquake Resistance oflow Strength Masonry Buildings.
6. SSRao;MechanicalVibration;Pearson,NewDelhi.

Sem	VII	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET36
Nameofthe Course	GROUNDIMPROVEMENTTECHNIQUES (ProfessionalElective–V)					
Branch	CIVILENGINEERING					

CourseOutcomes:
Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- Employ the in-situ densification methods at ground surface and at depth (K3)
- Relate the importance of dewatering and different methods of stabilization (K3)
- Illustrate the reinforced earth technology and soil nailingto obviate theproblems posed by conventional retaining walls (K3)
- Use the geosynthetics to improve the engineering performance of soils (K3)
- Select different techniques of grouting to solve the ground problems(K3)

SYLLABUS

UNIT I
In situ densification methods: In situ densification of granular soils-vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains –sand drains and geo drains – stone columns.

UNITII
Dewatering: Sumps and interceptor ditches – singleandmultistagewell points – vacuum well points – horizontal wells– electro osmosis
Stabilization of soils: Methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization– use of industrial wastes like fly ash and granulated blast furnace slag.

UNITIII
Reinforced earth: Principles – components ofreinforcedearth–stabilitychecks – soil nailing

UNITIV
Geosynthetics: Geotextiles – types – functions, properties and applications – geogrids, geomembranes and gabions – properties and applications.

UNITV
Grouting: Objectives of grouting – grouts and their applications – methods of grouting – stage of grouting.

TextBooks:

1. Ground Improvement Techniques, Purushotham Raj, Laxmi Publications, New Delhi.
2. Ground Improvement Techniques, Nihar Ranjan Patro, Vikas Publishing House (p) limited , New Delhi.
3. Anintroduction toSoilReinforcement andGeosynthetics, G.L.Siva Kumar Babu, Universities Press.

References:

1. Ground Improvement, M.P.Moseley, Blackie Academic and Professional, USA
2. DesigningwithGeosynethetics, R.MKoerner,PrenticeHall
3. Engineering Principlesof Ground Modification by Manfred R. Hausmann,McGraw-Hill Inc.,

Sem	VIISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET37
Nameofthe Course	RURALWATERSUPPLYANDONSITESANITATION SYSTEMS(ProfessionalElective–V)					
Branch	CIVILENGINEERING					

CourseOutcomes:
Uponthesuccessfulcompletionofcoursestudentswillbeableto

- Generalizetheconceptandscopeofsanitationinruralareas(K2)
- Applysuitablemethodsofwatertreatmentforruralareas(K3)
- Developthewaterdistributionsysteminruralareas(K3)
- Relatethedifferentpublicsanitationmethodsinruralareasand industrial zones (K3)
- Relatedifferentmethodsofsolidwastemanagementinruralareas(K3)

SYLLABUS

UNIT I
Concept of environmental and scope ofsanitationinruralareas:Magnitude of problem of water supply and sanitation–populationtobe covered and difficulties National policy, Various approaches forplanningof water supply systems in rural areas, Selection and development of preferred sources of water, springs, wells andinfiltrationgalleries,collectionofrawwater from surface source.

UNITII
Specificproblems: Specificproblemsinruralwatersupplyandtreatment iron,manganese,fluoridesetc.,Lowcosttreatment, appropriate technology for water supply and sanitation, Improvised method and compact system of treatment of surface and groundwaterssuchasMBsettlers,slow and sand filter, chlorine diffusion cartridge etc., Water supply through spot sources, hand pumps, open dug –well.

UNITIII
Planning of distribution system in rural areas: Water supply during fairs, festivals and emergencies, Treatment and disposal of wastewater/sewage, various method of collection and disposal of night soil

UNITIV
Rural sanitation and industrial hygiene: Simple wastewater treatment system for rural areas and small communities such as stabilization ponds, septic tanks, soakage pits etc., Occupational Hazards- Schools- Public Buildings- Hospitals- Eating establishments- Swimming pools – cleanliness and maintenance and comfort- Industrial plant sanitation

UNITV
SolidsWaste: Collection,Transfer,Transportanddepositofsolidwaste

management,composting,landfilling.

TextBooks:

1. "WaterSupplyandSanitaryEngineering"byRangwala,Charotar Publishing House Pvt Ltd.,
2. "Water Supply and Sanitary Engineering" by G.S.Birdie and J.S.Birdie, Dhanpat Rai Publishing Company

References:

1. "Manualofwatersupplyandtreatment", 3rdedition, CPHEEO,GOI, New Delhi.
2. "Solid Waste Engineering", Vesilind, P.A., Worrell, W., Reinhart, D., Cenage learning, New Delhi, 2004

Sem	VIISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET38
Nameofthe Course	METROSYSTEMSANDENGINEERING (ProfessionalElective–V)					
Branch	CIVILENGINEERING					

CourseOutcomes:
Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- GeneralizedifferentMetroSystemsandtheirplanning(K2)
- Relateconstructionmethodsofelevatedandunderground stations (K3)
- Employtheconstructionqualityandsafetysystems(K3)
- Illustratethemethodstoutilizeelectronicsignalingsystemsand automatic fare collection systems (K3)
- Organizethemechanicalandelectricalworkofdifferentsystems (K3)

SYLLABUS

UNIT I
General:OverviewofMetroSystems;NeedforMetros;Routingstudies;
Basic Planningand
Financials

UNITII
Construction Methods: Civil Engineering- Overview and construction methods for elevated and underground stations; Viaduct spans and bridges; Underground tunnels; Depots; Commercial and Service buildings, Initial Surveys & Investigations;

UNITIII
Quality& Safety Systems: Basics of Construction Planning& Management, Construction Quality& Safety Systems, Traffic integration, multimodal transfers and pedestrian facilities; Environmental and social safe guards; Track systems-permanent way. Facilities Management

UNITIV
Operation Control Center: Electronics and Communication Engineering-Signaling systems; Automatic fare collection; Operation Control Centre (OCC and BCC); SCADA and other control systems; Platform Screen Doors.

UNITV
Mechanical& Rolling Stock: Mechanical& TVS, AC: Rolling stock, vehicle dynamics and structure; Tunnel Ventilation systems; Air conditioning for stations and buildings; Fire control systems; Lifts and Escalators.
Electrical:OHE, Traction Power; Substations- TSS and ASS; Power SCADA; StandbyandBack-upsystems;Greenbuildings,Carboncreditsandclear air mechanics.

TextBooks:

1. "MetroRailinIndiaforUrbanMobility", byMMAgarwal,Sudhir Chandra and KK Miglani – Prabha& Co, 2021
2. "World Metro Systems", Paul Garbutt, Capital Transport Pub; 2nd Edition, 1997.

References:

1. General&TechnicalinformationofHyderabadMetro
2. General&TechnicalinformationofDelhiMetro

Sem	VIISem	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CET39
Nameofthe Course	ARCHITECTUREANDTOWNPLANNING (ProfessionalElective–V)					
Branch	CIVILENGINEERING					

CourseOutcomes:

Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- Distinguisharchitecturalstylesofeasternandwesternworld (K2)
- UnderstandtheimportanceofOrdersofarchitecture(K2)
- Developspacesofbuildingsusingdesignconcepts,planning principles (K3)
- Relate the present town planning from ancient times to moderntimes.
- Interpret the town planning standards, landscaping features and regulationscontrollingexpansionofthetownsandthecities(K3)

SYLLABUS:

UNITI

History of Architecture: Western Architecture: Egyptian, Greek, Roman Architectures- Orders. Indian Architecture: Vedic age, Indus valley civilization– Buddhist period: Stambas, Stupa, Toranas, Chaityas, Viharas – Hindu temples: Dravidian and Indo Aryan Styles-Temple of Aihole, Madurai, Bhuvaneshwar, Mount Abu. Indo Sarsanic (Islamic) Architecture: Mosque - Palace - Fort - Tomb.

UNITII

Architectural Design: Principles of designing – Composition of Plan – relationship between plan and elevation- building elements, form, surface texture, mass, line, color, tone- Principles of Composition: Unity, contrast, proportion, scale, balance, circulation, rhythm, character, expression.

UNITIII

Principlesof Planning: Principles of planning a residence- site selection, site orientation- aspect, prospect, grouping, circulation, privacy, furniture requirements, services and other factors. Post-classic Architecture: Introduction of post-classic architecture contribution of eminent architects to modern period-Edward Lutyens, Le Corbusier, Frank Lloyd Wrigt, Walter Groping.

UNITIV

Historical Back Ground of Town Planning: Town planning in India – Town plans of mythological Manasa - Town plans of ancient towns: Harappa, Mohenjodaro, Pataliputra, Delhi, Acropolis (Greece), Jerusalem, Mecca, Rome, London.

UNITV

Modern Town Planning: Zoning- Roads and road traffic- Housing- Slums, Parks, Play grounds- Public Utility Services- Surveys and maps for planning Neighborhood Planning. Standards of Town planning: Planning new towns, planning standards and specifications, national and regional planning, town planning and legislation planning regulations and limitations.

Land Scaping and Expansion of Towns: Land scaping for the towns, horizontal and vertical expansion of towns- garden cities, satellite towns floating towns- sky scrapers-pyramidal cities.

TextBooks:

1. 'ThegreatagesofWorldArchitecture'byG.K.Hiraskar.
2. 'Planning and Design of Buildings by Section of Architecture' by Y. S. Sane., Civil Engineering 142
3. 'Professional Practice' by G.K. Krishnamurthy, S.V. Ravindra, PHI Learning, New Delhi.
4. 'Indian Architecture – Vol. I& II' by Percy Brown, TaraporevalaPublications, Bombay.
5. 'FundamentalsofTownPlanning'byG.K.Haraskar.

References:

1. 'DraftingandDesignforArchitecture'byHepler,CengageLearning
2. 'Architect's PortableHandbook' by JohnPatten Guthrie – McGraw Hill International Publications.
3. 'ModernIdealHomesforIndia'byR.S.Deshpande.
4. 'TownandCountyPlanning'byA.J.BrownandH.M.Sherrard.
5. 'TownDesign'byFederikGlbbard,Architecturalpress,London.

ANNEXURE-III

COURSESOFFEREDUNDEROPENELECTIVEINV,VI&VIISEMESTER TO OTHER BRANCHES

NameoftheCourse	Coursecode
1.RepairandRehabilitationof Structures	V20CEOE01
2.GroundImprovementTechniques	V20CEOE02
3.EnvironmentalPollutionandControl	V20CEOE03
4.BuildingMaterialsandConstruction	V20CEOE04
5.RemoteSensingandGIS	V20CEOE05
6.SolidWasteManagement	V20CEOE06
7.DisasterManagement	V20CEOE07
8.WaterQualityandConservation Systems	V20CEOE08

COURSES OFFEREDUNDER MANDATORY COURSES IN V, VI& VIISEMESTER TO OTHER BRANCHES

NameoftheCourse	Coursecode
1.IntellectualPropertyRights&Patents	V20CEMC01
2.ProfessionalEthics&Human Values	V20CEMC02

OpenElective-I

Sem	V/VI/VII	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CEOE01
Name ofthe Course	REPAIRANDREHABILITATIONOFSTRUCTURES					
Branch	EXCEPTCE					

CourseOutcomes:

Uponthesuccessfulcompletionofcoursestudentswillbeableto

- Developvariousmaintenanceandrepairstrategies(K2)
- Evaluatetheexistingbuildingsthroughfieldinvestigations(K2)
- Understand and use the different techniques for structural rehabilitation and varioustechniques of repair (K2)
- Understandtheimportanceofadvancedconcretesmixes(K2)
- Understandtheimportanceofhighperformanceconcretes(K2)

SYLLABUS

UNIT I

DeteriorationofStructuresanddiagnosis: DistressinStructures–Causes and Prevention. Mechanism of Damage – Types of Damage, Non Destructive Testing, Corrosion of Steel Reinforcement – Causes–MechanismandPrevention. Damage of Structures due to Fire – Fire Rating of Structures – Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment –

UNITII

Materials for repair and rehabilitation: Admixtures- types of admixtures - purposes of using admixtures- chemical composition- Natural admixtures - Fibres- wraps- Glass and Carbon fibre wraps- Steel Plates

UNITIII

Strengthening and stabilization: Techniques- design considerations-Beam shear capacity strengthening - Shear Transfer strengthening-stress reduction techniques- Column strengthening-flexural strengthening - Connection stabilization and strengthening, Crack stabilization

UNITIV

Special Concretes: Fibre reinforced concrete: Properties of constituent materials- Mechanical properties of fiber reinforced concrete- applications of fibre reinforced concretes-Light weight concrete- properties of light weight concrete- No fines concrete- design of light weight concrete- Flyash concrete - classification of flyash- Properties of flyash concrete

UNITV

High performanceconcretes: Introduction-Developmentofhighperformance concretes-Materialsofhighperformanceconcretes-Properties of high performance concretes- Self Consolidating concrete-properties- qualifications.

TextBooks:

1. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.
2. ConcreteTechnologybyA.R.SantaKumar,OxfordUniversitypress
3. Concrete technology by Neville and J J Brooks, Pearson publications, 2nd edition

References:

1. ConcretetechnologybyMSShetty,S.Chandpublications(2006).
2. DefectsandDeteriorationinBuildings,EF&NSpon,London
3. Non-Destructive EvaluationofConcrete Structures byBungey– Surrey University Press
4. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W.H.Ranso, (1981)
5. Building Failures: Diagnosis and Avoidance, EF& N Spon, London, B.A. Richardson, (1991)

Sem	V/VI/VII	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CEOE02
Nameofthe Course	GROUNDIMPROVEMENTTECHNIQUES					
Branch	EXCEPTCE					

CourseOutcomes:

Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- Employ the in-situ densification methods at ground surface and at depth (K3)
- Relate the importance of dewatering and different methods of stabilization (K3)
- Illustrate the reinforced earth technology and soil nailing to obviate theproblems posed by conventional retaining walls (K3)
- Use the geosynthetics to improve the engineering performance of soils(K3)
- Select different techniques of grouting to solve the ground problems(K3)

SYLLABUS

UNIT I

In situ densification methods: In situ densification of granular soils-vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains –sand drains and geo drains – stone columns.

UNITII

Dewatering: Sumps and interceptor ditches – singleandmultistagewell points – vacuum well points – horizontal wells– electro osmosis

Stabilization of soils: Methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization – use of industrial wastes like flyash and granulated blast furnace slag.

UNITIII

Reinforced earth: Principles – components ofreinforcedearth–stabilitychecks – soil nailing

UNITIV

Geosynthetics: Geotextiles – types – functions, properties and applications – geogrids , geomembranes and gabions – properties and applications.

UNITV

Grouting: Objectives of grouting – grouts and their applications – methods of grouting – stage of grouting.

TextBooks:

1. Ground Improvement Techniques, Purushotham Raj, Laxmi Publications, New Delhi.
2. Ground Improvement Techniques, Nihar Ranjan Patro, Vikas Publishing House (p) limited , New Delhi.
3. Anintroduction toSoilReinforcement andGeosynthetics, G.L.Siva Kumar Babu, Universities Press.

References:

1. Ground Improvement, M.P.Moseley, Blackie Academic and Professional, USA
2. DesigningwithGeosynethetics,R.MKoerner,PrenticeHall
3. Engineering Principlesof Ground Modification by Manfred R. Hausmann,McGraw-Hill Inc.,

Sem	V/VI/VII	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CEOE03
Nameofthe Course	ENVIRONMENTALPOLLUTIONANDCONTROL					
Branch	EXCEPTCENG					

CourseOutcomes:
Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- Describetheairpollutionanditscontrolmethods(K2)
- Explainindustrialwastewaterandwaystocontrolit(K3)
- Generalizethesolid,hazardouswasteandcontrolmethods(K2)
- IllustratetheimportanceofEnvironmentalsanitationmethods(K2)
- IllustratetheimportanceofSustainabledevelopment(K3)

SYLLABUS

UNIT I
AirPollution:AirpollutionControlMethods–Particulatecontroldevices–MethodsofControllingGaseousEmissions–Airqualitystandards.Noise Pollution: Noise standards, Measurement and control methods

UNITII
Industrial wastewater Management: Strategies for pollution control – Volume and Strength reduction-Recirculation of industrial waste water – Effluent standards.

UNITIII
Solid Waste Management: Solid waste characteristics –on-site handling and collection – separation and processing -Solid waste disposal method
Hazardous Waste: Characterization – Nuclear waste – Biomedical wastes – Electronicwastes–Chemicalwastes–Treatmentandmanagementof hazardous waste-Disposal methods.

UNITIV
Environmental Sanitation: Environmental Sanitation Methods for Hostels and Hotels, Hospitals, Swimming pools and public bathing places, social gatherings (melas and fares), Schools and Institutions, Rural Sanitation-low cost waste disposal methods.

UNITV
Sustainable Development: Definition- elements of sustainable developments-Indicators of sustainable development-Sustainability Strategies- sustainable development.

TextBooks:

1. EnvironmentalEngineering,byRuthF.WeinerandRobinMatthews– 4th Edition Elesevier, 2003.
2. EnvironmentalScienceandEngineeringby J.G.Henry andG.W.Heinke – PearsonEducation.
3. EnvironmentalEngineeringbyMackenzieLDavis&DavidACornwell. McGraw Hill Publishing.

References:

1. Solid Waste Engineering, Vesilind, P.A., Worrell,W.,Reinhart,D., Cenage learning, New Delhi, 2004
2. Hazardous WasteManagement, Charles A. Wentz, McGraw Hill Publication, 1995.

Sem	V/VI/VII	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CEOE04
Nameofthe Course	BUILDINGMATERIALSANDCONSTRUCTION					
Branch	EXCEPTCE					

CourseOutcomes:

Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

- Describedifferentbuildingmaterialsandtheirimportancein building construction (K2)
- Relatevariouscomponentsofcementandlime(K3)
- Generalizethebrickandstonemasonryinconstruction(K2)
- Interpretdifferentaggregatesandtheirspecifications(K2)
- Describetheimportanceofdifferentbuildingcomponents(K2)

SYLLABUS

UNIT I

Stones, Bricks and Tiles: Building stones – classifications and quarrying – properties –structural requirements and dressing.Bricks–CompositionofBrick earth – manufacture and structural requirements, Fly ash, Ceramics, Timber, Aluminum, Glass, Paints and Plastics: Wood - structure – types and properties– seasoning – defects; alternate materials for Timber–GI/ fibre – reinforced glass bricks, steel& aluminum, Plastics.

UNITII

Cement& Admixtures: Ingredients of cement – manufacture – Chemical composition – Hydration - field & lab tests, Admixtures – mineral & chemical admixtures – uses, Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime

UNITIII

Mortars: LimeandCementMortars.

Masonry: Brick masonry – types – bonds; Stone masonry – types; Composite masonry–Brick-stonecomposite;Concrete,Reinforcedbrick.Cavity and partition walls, Finishing's,Plastering,Pointing,Painting,Claddings–Types – Tiles – ACP.

UNITIV

Aggregates: Classification of aggregate – Coarse and fine aggregates- particle shape and texture – Bond and Strength of aggregate – Specific gravity – Bulk Density, porosity and absorption – Moisture content of Aggregate- Bulking of sand – Sieve analysis.

Miscellaneous materials: Bitumen and asphaltic materials, structural steel and other metals, geo textiles, carbon composites including properties and uses.

UNITV

Building Components: Lintels, Arches, walls, vaults – stair cases – types of floors, types of roofs – flat, curved, trussed. Foundations – types; Damp Proof Course; Joinery – doors – windows – materials – types.

Formwork: Types:Requirements–Standards–Scaffolding.

TextBooks:

1. BuildingMaterialsandConstruction–Arora&Bindra,DhanpatRoy Publications. 2010,5th edition.
2. Building Materials, M. L. Gambhir, Tata McGraw HillPublishingCo. Ltd. New Delhi. 2014,5th edition,.
3. BuildingConstructionbyB.C.Punmia,AshokKumarJainandArun Kumar Jain – Laxmi Publications (P) ltd., New Delhi. 2016,11th edition.
4. Building Materials, S. S. Bhavikatti, Vikas publications House private ltd. 2012, 1st edition.
5. Building Construction, S. S. Bhavikatti, Vikas publicationsHouse private ltd. 2012, 1st edition.
6. Building planning and drawing,Dr.N.Kumara swamy,A.kameswara Rao, 2012, 6th edition.

References:

1. BuildingMaterialsandConstructionbyGCSahu,JoygopalJena McGraw hill Pvt Ltd 2017,1st edition.
2. BuildingMaterialsbyDuggal, New Age International.2012,4thedition.
3. BuildingMaterialsbyP.C.Varghese,PHI.2015,2ndedition.
4. BuildingConstructionbyPCVarghesePHI.2007,1stedition.
5. ConstructionTechnology–Vol–I&IIbyR.Chubby,Longman UK.1987, 2nd edition.
6. AlternateBuildingMaterialsandTechnology,Jagadish,Venkatarama Reddy and others; New Age Publications.2017 ,2nd edition

Sem	V/VI/VII	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CEOE05
Nameofthe Course	REMOTE SENSINGAND GEOGRAPHICAL INFORMATION SYSTEM					
Branch	EXCEPTCE					

Course Outcomes:

Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- Generalizethebasicprinciples ofRemoteSensingand GIS, including ground, air and satellitebased sensor platforms (K2)
- Interprettheaerialphotographsandsatelliteimageries(K2)
- Relatetheprocessofdataentryandpreparation(K3)
- ExaminetheSpatialDataforavarietyofapplications(K3)
- EmployRSandGISfordiverseapplications (K3)

SYLLABUS

UNIT I

Introduction to Remote Sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces,Characteristicsof remote sensing systems.

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, space borne remote sensing, image datacharacteristics,digitalimage data formats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT, MODIS, ASTER,RISAT and CARTOSAT.

UNITII

Image analysis: Introduction, elements of visual interpretations, digital image processing- image preprocessing, image enhancement, image classification, supervised classification, unsupervised classification.

UNITIII

GeographicInformationSystem: Introduction, keycomponents,application areas of GIS, map projections.

Data entry and preparation:spatial data input,rasterdatamodels,vectordata models.

UNITIV

Spatial data analysis: Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing and buffer analysis.

UNITV

RS and GIS Applications: Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications.

Applications of Hydrology, Water Resources and Disaster Management: Food zoning and mapping, groundwater prospects and potential recharge zones, watershed management and disaster management with case studies.

TextBooks:

1. "RemotesensingandGIS",Bhatta,B.,OxfordUniversityPress,2008.
2. "RemoteSensing and GeographicalInformationSystems",Anji Reddy, M., B S Publications, 2008.
3. "BasicsofRemoteSensingandGIS"Kumar.S.,LaxmiPublications,

References:

1. "Fundamentals of Remote Sensing", George Joseph, Universities Press, 2013.
2. "Conceptsand Techniquesof Geographical Information System", Chor Pang Lo and Yeung, A.K.W., Prentice Hall, India, 2006.
3. "Remote Sensing and its Applications", Narayan L.R.A, Universities Press, 2012.
4. "Introduction to Geographic Information Systems", Kand Tsung Chang, McGraw Hill Higher Education, 2009.
5. "Basics of Remote sensing& GIS", Kumar, S., Laxmi Publications, NewDelhi, 2005.
6. "PrincipalsofGeographicalInformationSystems",Burrough,P.Aand McDonnell, R.A. Oxford University Press, 1998.
7. "RemoteSensing",Schowenger,R.A.,Elsevierpublishers,2006.
8. "RemoteSensing andImageInterpretation", Lillesand, T.M,Kiefer,R.W. and Chipman, J.W., Wiley India Pvt. Ltd., New Delhi, 2013.
9. "FundamentalsofGeographicInformationSystems",Demers,M.N, Wiley India Pvt. Ltd, 2013

Sem	V/VI/VII	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CEOE06
Name ofthe Course	SOLIDWASTE MANAGEMENT					
Branch	EXCEPTCE					

CourseOutcomes:

Uponsuccessfulcompletionofthiscourse,thestudentswillbeableto

- GeneralizeSolidWasteanditsmanagement(K2)
- AssessdifferentelementsformanagingSolidWaste(K3)
- Employ different methods for transportation and transformation of solid waste (K3)
- Organizedifferent methodsforprocessingandtreatment ofmunicipal solid waste (K3)
- Practicesuitabledisposalmethodswithrespecttosolidwaste(K3)

SYLLABUS

UNIT I

Introduction to Solid Waste Management: Goals and objectives of solid waste management, Classification of Solid Waste – Factors Influencing generation of solid waste – sampling and characterization –Future changes in waste composition, major legislation, monitoring responsibilities.

UNITII

Basic Elements In Solid Waste Management: Elements and their inter relationship – principles of solid waste management- onsite handling,storageand processing of solid waste Collection of Solid Waste: Types and methods of waste collection systems, analysis of collection system – optimizationof collection routes.

UNITIII

Transportation and Transformation of Solid Waste: Need for transfer operation, compactionofsolidwaste–transportmeansandmethods, transfer station types and design requirements.

Unit operations used for separation and transformation: shredding –materials separation and recovery, source reduction and waste minimization.

UNITIV

Processing and Treatment: Processing of solid waste – Waste transformation through combustion andcomposting,anaerobicmethodsformaterialsrecovery and treatment – Energy recovery – biogas generation and cleaning– Incinerators.

UNITV

Disposal of Solid Waste: Methods of Disposal, Landfills:Siteselection, design and operation, drainage and leachate collection systems –designated waste landfill remediation.

TextBooks:

4. "Integrated Solid Waste Management", George Techobanoglous, McGraw Hill Publication, 1993
5. "EnvironmentalEngineering",GerardKiely,McGrawHillPublication,2007
6. "Environmental Science and Engineering",JGlynn Henry,. Gary W.Heinke, Prentice-Hall of India Pvt Ltd, 1996

References:

3. "SolidWasteEngineering",Vesilind,P.A.,Worrell,W.,Reinhart,D., Cenage learning, New Delhi, 2004
4. "Hazardous Waste Management", Charles A. Wentz., McGraw Hill Publication, 1995.
4. "IntroductiontoEnvironmentalEngineering"MackenzieLDavis,David A.Cornwell, McGraw Hill Publication, 2017

Sem	V/VI/VII	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CEOE07
Name ofthe Course	DISASTERMANAGEMENT					
Branch	EXCEPTCE					

CourseOutcomes:
Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- Describedifferentnaturalhazardsanddisastermanagement(K2)
- Generalizetheriskandvulnerabilityofdisaster(K2)
- Illustratetheroleoftechnologyindisastermanagement(K3)
- Relatetheimportanceofeducationandcommunitypreparednessto disaster recovery(K3)
- Organizethemulti-sectionalissuescreatedbydisaster(K2)

UNITI
Natural Hazards and Disaster Management: Introduction of DM Disaster Management cycle – Five priorities for action- Case study methods of the following: floods, droughts – Earthquakes – global warming, cyclones& Tsunamis – Post Tsunami hazards along the Indian coast – landslides. Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrotirism - rail and air craft's accidents-Management of these disasters

UNITII
Risk and Vulnerability: –Building codes and land use planning – social vulnerability–environmentalvulnerability-Financialmanagementofdisaster.

UNITIII
Role of Technology in Disaster Managements: Disaster management for infra structures, taxonomy of infra structure - mitigation programmefor earth quakes –geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training-transformable indigenous knowledge in disaster reduction.

UNITIV
Education and Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -Community based disaster management and social capital-Designing resilience- building.

UNITV

Multi-sectional Issues: Impact of disaster on poverty and deprivation-Climate change adaptation and humanhealth-Exposure, healthhazards and environmental risk-Forest management and disaster risk reduction - The Red cross and red crescent movement.

TextBooks:

1. Disaster Management – Global Challenges and Local Solutions' by Rajib shah & R R Krishnamurthy(2009),Universities press.
2. Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. Disaster Management – Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

ReferenceBooks:

1. 'DisasterManagement'editedbyHKGupta(2003),Universities press.
2. Natural Hazards and Disaster Management, Vulnerability and Mitigation by RB Singh
3. DisasterManagementbyHarishK.Gupta

Sem	V/VI/VII	L	T	P	C	COURSECODE
Regulation	V20	3	0	0	3	V20CEOE08
Nameofthe Course	WATERQUALITYANDCONSERVATIONSYSTEMS					
Branch	EXCEPTCE					

CourseOutcomes:
Uponsuccessfulcompletionofthecourse,thestudentwillbeableto

- DescribedifferentparametersofEngineeringHydrology(K2)
- Relatedifferentsourcesofsurfaceandgroundwater(K3)
- Assess the importance of watersupply systems and quality of waterinreference to IS and WHO standards (K3)
- Developdifferentsystemsofplumbing(K3)
- Employdifferentconservationtechniques(K3)

SYLLABUS

UNIT I
Introduction to Hydrology: Engineering hydrology, applications, Hydrologic cycle, evaporation, evapotranspiration, precipitation, run off, infiltration, hydrological data-sources

UNITII
Sources of Water: Surface water, Lakes, Rivers, Reservoirs, comparison of sources with reference to quality, quantity and other considerations.
Groundwater, types ofwaterbearingformations,springs,Wellsand Infiltration galleries, Yields from infiltration galleries.

UNITIII
Importance of Protected Water: Supply systems, Flow chart of public water supply system, Water borne diseases, Estimation of water usages in different purpose.

Quality and Analysis of Water: Characteristics of water–Physical, Chemical and Biological-Analysis of Water – Physical, Chemical and Biological characteristics, Comparison of sources with reference to quality- I.S. Drinking water quality standards and WHO guidelines for drinking water.

UNITIV
PlumbingSystems: Systems of plumbing-types of pipes andsanitary fittingsand other accessories–one pipeandtwopipesystems–Designparametersand factors.

UNITV
Water conservation: importance and necessity, objectives, systems-rainwater harvesting, recharge pits, watershed.

TextBooks:

1. EnvironmentalEngineering–HowardS.Peavy,DonaldR.Rowe,Teorge George Tchobanoglus – Mc-Graw-Hill Book Company, New Delhi, 1985
2. ElementsofEnvironmentalEngineering,K.N.Duggal,S.Chand& Company Ltd. New Delhi, 2012.
3. WaterSupplyandSanitaryEngineering–G.S.BirdieandJ.S.Birdie

References:

1. WaterSupply Engineering– P.N.Modi.
2. WaterSupplyEngineering–B.C.Punmia
3. WaterSupplyandSanitaryEngineering–G.S.BirdieandJ.S.Birdie

Sem	VISem	L	T	P	C	COURSECODE
Regulation	V20	2	0	0	0	V20CEMC01
Name ofthe Course	INTELLECTUALPROPERTYRIGHTS&PATENTS					
Branch	CommontoAllBranches					

Course Outcomes:

Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- DescribetheneedofIntellectualPropertyRights(K2)
- GeneralizedifferentissuesregardingCopyRights(K2)
- EmploytheprocedureforPatentregistrationandgranting(K3)
- DiscusstheimportanceofTrademarkanditsrelatedissues(K2)
- RecognizethesignificanceofTradeSecretsinIndustry(K2)

SYLLABUS

UNIT I

Introduction to Intellectual Property Rights (IPR): Introduction to IPR, Evolutionary Past, Concept of IPR – Purpose of IPR, Types of IPR, WIPO - TRIPS, Nature of IPR, Patents, Trademarks, Copyrights, Neighboring Rights, Agencies responsible for IPR - Infringement, Use and Misuse of Intellectual Property Rights.

UNITII

Copyrights: Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights - Copyright Ownership – Transfer and Duration – Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Semiconductor Chip Protection Act.

UNITIII

Patents: Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Registration and GrantingofPatent-ExclusiveRights–Limitations-OwnershipandTransfer– – Revocation of Patent – Patent Appellate Board - Infringement of Patent – Compulsory Licensing –SoftwareProtectionandComputerrelatedInnovations.

UNITIV

Trademarks: Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark – – TradeMarkRegistration–TradeMarkMaintenance – Transfer of rights – Deceptive Similarities - Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies – Passing Off Action.

UNITV

Trade Secrets: Introduction to Trade Secrets – General Principles -Laws Relating to Trade Secrets - Maintaining Trade Secret – Physical Security – Employee Access Limitation –EmployeeConfidentialityAgreements–Breachof Contract –Law of Unfair Competition – Trade SecretLitigation–ApplyingState Law, Cyber Law and Cyber Crime

TextBooks:

1. Intellectual Property Rights (Patents& Cyber Law), Dr. A. Srinivas.Oxford University Press, New Delhi.
2. PrabhuddhaGanguli:IntellectualPropertyRights,TataMc-Graw–Hill, New Delhi
3. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.

References:

1. Deborah E.Bouchoux: Intellectual Property, Cengage Learning, New Delhi.
2. RichardStim:IntellectualProperty,CengageLearning,NewDelhi.
3. Kompal Bansal &Parishit Bansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
4. Cyber Law- Texts& Cases, South-Western's Special Topics Collections.
5. M.Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, Serials Pub.

Sem	VISem	L	T	P	C	COURSECODE
Regulation	V20	2	0	0	0	V20CEMC02
Nameofthe Course	PROFESSIONALETHICSANDHUMANVALUES					
Branch	CommontoAllBranches					

Course Outcomes:

Uponsuccessfulcompletionofthiscoursethestudentwillbeableto

- Discusstheimportanceofhumanvaluesandtheircontext(K2)
- Generalizetheprofessionalethicsand norms ofengineeringpractice (K2)
- Review the contextual knowledge of engineering as social experimentation (K2)
- Identifytheengineer'sresponsibilityforSafety&Risks(K2)
- Clarifytheprofessionalrights&responsibilitiesatgloballevel(K2)

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UNITI

Human Values: Morals, Values and Ethics – Integrity – Work Ethics – Service Learning –Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing –Honesty –Courage – Value time – Co-operation – Commitment – Empathy –Self-confidence–Spirituality-Character.

UNITII

Engineering Ethics: The History of Ethics, Purposes for Engineering Ethics, Consensus and Controversy, Professional and Professionalism, Professional Roles to be played by an Engineer –Self Interest, Customs and Religion,Uses of Ethical Theories, Professional Ethics, Types of Inquiry inEngineering Ethics.

UNITIII

Engineering as Social Experimentation: Comparison with Standard Experiments –now ledge gained–Conscientiousness–Relevant Information– Learning from the Past–Engineers as Managers, Consultants, and Leaders – Accountability–RoleofCodes–odesandExperimentalNatureofEngineering.

UNIT IV

Engineers'ResponsibilityforSafetyandRisk: SafetyandRisk,Conceptof Safety – Types of Risks – Voluntary v/s Involuntary Risk- Short term v/s long term Consequences, Delayed v/s Immediate Risk- Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

UNITV

Engineers' Responsibilities, Rights& Global Issues: Collegiality, Senses of Loyalty, professionalism and Loyalty, Professional Rights& Responsibilities– confidential and proprietary information, Bribes/Gifts, Whistle Blowing. Globalization- Cross-culture Issues, Environmental Ethics, Computer Ethics, Weapons Development Ethics and Research Ethics, Intellectual Property Rights.

TextBooks:

1. "EngineeringEthics and Human Values" by M. Govindarajan, S.Natarajan and V.S.Senthil Kumar-PHILearningPvt.Ltd-2009.
2. "ProfessionalEthics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi Publications.
3. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran-Laxmi Publications.

References:

1. "ProfessionalEthicsandHumanValues"byProf.D.R.Kiran.
2. "Indian Culture,Values and Professional Ethics"by PSRMurthy-BS Publication.
3. "EthicsinEngineering"byMikeW.MartinandRolandSchinzinger–TMH.