

CIVIL ENGINEERING (4 Year B.Tech Programme) - COURSE CURRICULUM R-20

**Total
Credits:160**

I Year Course structure

Semester - I

Course Code	Title of the course	Category	Periods						Sessionals Marks	Semester end Exam marks	Total Marks	Credits
			L	T	P	E	O	Total				
CIV111	Engineering Mathematics – I	BS	3	0	0	1	6	10	40	60	100	3
CIV112	Engineering Physics	BS	3	0	0	1	4	8	40	60	100	3
CIV113	Engineering Chemistry	BS	3	0	0	1	4	8	40	60	100	3
CIV114	Building Technology	PC	2	1	0	1	2	6	40	60	100	3
CIV115	Engineering Drawing	ES	2	0	3	1	4	10	40	60	100	3.5
CIV116	Engineering Physics Lab	BS	0	0	3	0	1	4	50	50	100	1.5
CIV117	Engineering Chemistry Lab	BS	0	0	3	0	1	4	50	50	100	1.5
CIV118	Engineering Workshop	ES	0	0	3	0	1	4	50	50	100	1.5
CIV119	Human Values and Professional Ethics(Mandatory non-credit course)	MC	3	0	0	0	1	4	50	0	50	-
Total			16	1	12	5	24	58	400	450	850	20

Semester - II												
Course Code	Title of the course	Category	Periods						Sessionals Marks	Semester end Exam marks	Total Marks	Credits
			L	T	P	E	O	Total				
CIV121	Engineering Mathematics – II	BS	3	0	0	1	6	10	40	60	100	3
CIV122	Communicative English	HSS	3	0	0	0	2	5	40	60	100	3
CIV123	Engineering Geology	BS	2	0	1	1	2	6	40	60	100	3
CIV124	Engineering Mechanics	ES	2	1	0	1	4	8	40	60	100	3
CIV125	Problem solving with C	ES	3	0	0	1	3	7	40	60	100	3
CIV126	English Language Lab	HSS	0	0	3	0	1	4	50	50	100	1.5
CIV127	Problem solving with C– lab	ES	0	0	3	0	1	4	50	50	100	1.5
CIV128	Environmental Science (Mandatory non-credit course)	MC	3	0	0	0	1	4	50	0	50	-
Total			16	1	7	4	20	48	350	400	750	18

II Year Course structure

Semester - I

Course Code	Title of the course	Category	Periods						Sessionals Marks	Semester end Exam marks	Total Marks	Credits
			L	T	P	E	O	Total				
CIV211	Engineering Mathematics - III	BS	2	1	0	1	2	6	40	60	100	3
CIV212	Building Planning & Design	SOC	2	0	2	1	2	7	40	60	100	3
CIV213	Environmental Engineering-I	PC	2	1	0	1	2	6	40	60	100	3
CIV214	Strength of Materials	ES	2	1	0	2	3	8	40	60	100	3
CIV215	Surveying & Geomatics	ES	3	1	0	1	2	7	40	60	100	4
CIV216	Surveying Field Work	SOC	0	0	3	0	1	4	50	50	100	1.5
CIV217	Strength of Materials Lab	PC	0	0	3	0	1	4	50	50	100	1.5
CIV218	Environmental Engineering Lab	PC	0	0	3	0	1	4	50	50	100	1.5
Total			11	4	11	6	14	40	340	460	800	20.5

Semester - II

Course Code	Title of the course	Category	Periods						Sessionals Marks	Semester end Exam marks	Total Marks	Credits
			L	T	P	E	O	Total				
CIV221	Environmental Engineering-II	PC	2	1	0	2	2	7	40	60	100	3
CIV222	Fluid Mechanics-I	PC	2	1	0	2	3	8	40	60	100	3
CIV223	Concrete Technology	PC	3	0	0	1	2	6	40	60	100	3
CIV224	Geotechnical Engineering – I	PC	2	1	0	2	2	7	40	60	100	3
CIV225	Structural Analysis – I	PC	2	1	0	2	3	8	40	60	100	3
CIV226	Building Architecture with Revit	SOC	0	0	3	0	1	4	50	50	100	1.5
CIV227	Concrete Technology Lab	PC	0	0	3	0	1	4	50	50	100	1.5
CIV228	Geotechnical Engineering Lab	PC	0	0	3	0	1	4	50	50	100	1.5
CIV229	Summer Internship-I*	PR	0	0	0	0	4	4	-	-	-	-
Total			11	4	9	9	19	52	350	450	800	19.5

* Summer internship-I to be conducted after II year-II semester and evaluated in III year-I semester

III Year Course structure

Semester - I

Course	Title of the course	Category	Periods						Sessionals	Semester end	Total	Credits
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Code			L	T	P	E	O	Total	Marks	Exam marks	Marks	
CIV311	Open Elective-I [#]	OE	2	1	0	1	2	6	40	60	100	3
CIV312	Fluid Mechanics-II	PC	2	1	0	2	4	9	40	60	100	3
CIV313	Geotechnical Engineering – II	PC	2	1	0	2	3	8	40	60	100	4
CIV314	Reinforced Concrete Structures-I	PC	2	1	0	2	2	7	40	60	100	3
CIV315	Structural Analysis – II	PC	2	1	0	2	3	8	40	60	100	3
CIV316	Computer Applications in Civil Engineering Lab	SOC	0	0	3	0	1	4	50	50	100	1.5
CIV317	Fluid Mechanics Lab	PC	0	0	3	0	1	4	50	50	100	1.5
CIV318	Technical Seminar	PR	0	0	3	0	1	4	100	-	100	2
CIV319	Quantitative Aptitude-I & Verbal Aptitude-I	HSS	0	0	3	1	3	7	100	0	100	1.5
CIV3110	Summer Internship-I*	PR	0	0	0	0	4	4	100	-	100	1.5
Total			10	5	12	10	24	61	600	400	1000	24

Semester - II											
Course Code	Title of the course	Category	Periods					Sessionals Marks	Semester end Exam marks	Total Marks	Credits
			L	T	P	E	O				

CIV321	Open Elective-II [#]	OE	2	1	0	1	2	6	40	60	100	3
CIV322	Professional Elective – I	PE	3	0	0	1	2	6	40	60	100	3
CIV323	Steel Structures	PC	2	1	0	2	3	8	40	60	100	3
CIV324	Reinforced Concrete Structures-II	PC	2	1	0	2	3	8	40	60	100	4
CIV325	Highway Engineering	PC	2	1	0	1	2	6	40	60	100	4
CIV326	Irrigation Engineering	PC	2	1	0	2	2	7	40	60	100	4
CIV327	Structural Analysis & Design using Staad Pro	SOC	0	0	3	0	2	5	50	50	100	1.5
CIV328	Transportation Engineering Lab	PC	0	0	3	0	1	4	50	50	100	1.5
CIV329	Quantitative Aptitude-II & Soft Skills	HSS	0	0	3	2	3	8	100	0	100	1.5
CIV3210	Summer Internship-II*	PR	0	0	0	0	4	4	-	-	-	-
Total			13	5	9	11	24	62	440	460	900	25.5

Open Electives can be either interdisciplinary subjects/emerging subject/MOOCs as decided by the Department.

* **Summer Intership-II** to be conducted after III year-II semester and evaluated in IV year-I semester

IV Year Course structure

Semester – I

Course Code	Title of the course	Category	Periods						Sessionals Marks	Semester end Exam marks	Total Marks	Credits
			L	T	P	E	O	Total				

CIV411	Open Elective-III#	OE	2	1	0	1	2	6	40	60	100	3
CIV412	Estimation & Costing	PC	2	1	0	2	3	8	40	60	100	3
CIV413	Professional Elective – II	PE	3	0	0	1	2	6	40	60	100	3
CIV414	Professional Elective – III	PE	3	0	0	1	2	6	40	60	100	3
CIV415	Professional Elective – IV	PE	2	1	0	2	3	8	40	60	100	3
CIV416	Project work-I	PR	0	0	6	0	6	12	100	-	100	2
CIV417	Summer Internship-II*	PR	0	0	0	0	4	4	100	-	100	1.5
Total			12	3	6	7	22	50	400	300	700	18.5

Semester – II												
Course Code	Title of the course	Category	Periods						Sessionals Marks	Semester end Exam marks	Total Marks	Credits
			L	T	P	E	O	Total				
CIV421	Open Elective - IV#(MOOCs)	OE	2	1	0	1	2	6	40	60	100	3
CIV422	Professional Elective – V(MOOCs)	PE	2	1	0	1	2	6	40	60	100	3
CIV423	Project Work –II	PR	0	0	9	0	9	18	50	50	100	8
Total			4	2	9	2	13	30	130	170	300	14

* **Summer Internship-II** to be conducted after III year-II semester and evaluated in IV year-I semester

Open Electives can be either interdisciplinary subjects/emerging subject/MOOCs as decided by the Department

IV Year I Sem
Detailed Syllabus

LIST OF PROFESSIONAL ELECTIVES (CIVIL ENGINEERING) (R 20)

III B.Tech – II Semester

Professional Elective – I (CIV 322)

1. Ground Improvement Techniques
2. Solid Waste Management
3. Repair and Rehabilitation of structures
4. Urban Planning and Smart Cities
5. Optimization Techniques

IV B.Tech – I Semester

Professional Elective – II (CIV 413)

1. Transportation engineering - II
2. Disaster Management
3. Earth and Earth Retaining Structures
4. Bridge Engineering
5. RS & GIS application in Civil Engineering

Professional Elective – III (CIV 414)

1. Pre stressed concrete
2. Advanced Fluid Mechanics
3. Advanced Design of structures
4. Water Resource Engineering - II
5. Soil Dynamics and Machine Foundation
6. Introduction to Finite Element Methods
7. Advanced Transportation Engineering

Professional Elective – IV (CIV 415)

1. Watershed management
2. Advanced Building Construction
3. Earthquake Engineering
4. Environment Impact Analysis
5. Air Pollution Control

6. Engineering Economics and Finance

ESTIMATION & COSTING

CIV 412 - PC

Instruction : 3 Lectures & 1 Tutorial / week

End Exam : 3 Hours

Credits : 3

Sessional Marks : 40

End Exam Marks : 60

Prerequisites:

Civil Engineering Materials, Building Technology, Building Planning and Design.

Course Objectives:

1. To understand the types of estimates
2. To understand rate analysis and process of preparation of bills
3. To study about the specification writing

SYLLABUS

UNIT – I

12 Periods

Introduction: Standard units, Units of measurement of different items of work. Meaning of estimating. Errors in estimation, Different types of estimates. Contingencies and related terms in the estimate, different types of approvals. Plinth area and related terms used in the estimation of various structures, rules and methods of measurements of different works.

Learning Outcomes:

1. Understand the basic concepts of estimation
2. Know the methods of measurements of different works

UNIT – II

12 Periods

Specifications: Specifications for framed buildings: Meaning, purpose, types of specifications, Method of preparation of specification, general specification, detailed specifications of different items of framed buildings and other structures.

Learning Outcomes:

1. Prepare specifications for different items of buildings.
2. Able to identify the quality of different items of buildings.

UNIT – III

12 Periods

Rate analysis: Data sheet for materials and various items of work in buildings and other structures, schedule of rates, abstract estimate of buildings.

Learning Outcomes:

1. Analyze the rates of various items of work in building.
2. Prepare abstract estimate of building.

UNIT – IV

12 Periods

Estimation: Estimation of load bearing structures by Long wall - short wall method and Centre line method.

Detailed estimate of framed buildings - Estimation of Different items of works in substructure, Earthwork, P.C.C, Foundation Concrete, D.P.C in R.C.C building- Single Bedroom, Double Bed Room and Triple bedroom with partition walls and verandah.

Learning Outcomes:

1. Learn how to estimate the different items of works in substructure and superstructure.
2. Prepare a detailed estimate of building.

UNIT – V

12 Periods

Estimation of Superstructure: Estimation of various items of R.C.C building works in superstructure: Super structure walls and columns, slab beams, plinth beam, columns, Deductions, Plastering and White Washing and Color Washing, Sloped Roof Buildings; G.I. and A.C. Sheet, Electricity and water supply. Sanitation works etc, Estimation of Prefabricated structures.

Learning Outcomes:

1. Learn how to estimate the different items of R.C.C building works.
2. Prepare a bar bending schedule.

TEXT BOOKS

1. Datta, B.N. (2002), "Estimating and costing", Charator Publishing House, 27th Edition, Gujarat
2. Chakraborti, M. (2006), "Estimating, Costing, Specification and Valuation in Civil Engineering, 28th Edition,

REFERENCES

1. Birdie .G.S. (2000), "A Text Book on Estimating and Costing", Dhanpat Rai and Sons, New Delhi.
2. Bhasin, P.L. (2000), "Quantity Surveying", S. Chand & Co., 2nd Edition, New Delhi.
3. Relevant NPTEL Courses.

PROFESSIONAL ELECTIVE – II
TRANSPORTATION ENGINEERING - II

CIV 413 A

Instruction: 3 Lectures / week

End Exam: 3 Hours

Credits: 3

Sessional Marks: 40

End Exam Marks: 60

Prerequisites:

Nil

Course Objective:

1. To study various components and their functions in a railway track.
2. To acquire design principles of geometrics in a railway track.
3. To study various elements in points and crossings.
4. To acquire design principles of airport geometrics and pavements.

SYLLABUS

UNIT – I

12 Periods

Railway Engineering – 1: Role of railways in transportation - classification of modes - Comparison of railway and highway transportation - Historical development of railways in India - Advantages of Railways – Classification of Indian Railways – Engineering Surveys for Track Alignment – Obligatory points – Gauges in railway track - Permanent way - Components and their functions – Types of Rails - Rail joints – Welding of Rails – Creep of Rails – Rail fixtures & Fastenings - Coning of Wheels.

UNIT – II

12 Periods

Railway Engineering – 2: Track alignment – requirements of good alignment, factors in selection of good alignment; Geometric design of the track – Gradients and Grade Compensation, Super-Elevation, Widening of Gauges in Curves, Transition Curves, Horizontal/Vertical Curves.

UNIT – III

12 Periods

Railway Engineering – 3: Points and crossings – Necessity – Types, component parts and their functions; Track junctions – types of track junctions; Track drainage – Layout of Railway stations and yards – Signals – Interlocking – Track circuiting – Track Maintenance.

UNIT – IV

12 Periods

Airport Engineering: Layout of Airports – Components functions – Aircraft characteristics – Airport site selection – Airport obstructions and zoning – Runway design – Visual aids – Air traffic control.

UNIT – V

12 Periods

Dock & Harbour Engineering: Layout of Port components – Functions – Classification of Ports – Site selection – breakwaters - Natural Phenomenon – Tides, Winds, Waves, Currents – Drift – warehouses - Navigational aids.

TEXT BOOKS

1. Saxena S.C and Arora S.P “Railway Engineering”, Dhanapat Rai Publications, 7th Edition, (2010)
2. Khanna, S.K. and Arora, M.G. “Airport Planning and Design” Nemchand & Bros., 6th Edition (2017).

REFERENCES

1. K.P.Subramanian (2003), “Highway, Railway, Airport and Harbour Engineering” Scitech Publications (India) Pvt. Ltd.
2. Rangwala S.C & K.S. “Railway Engineering”, Charotar Publications, 14th Edition, 2005.
3. Robert M. Horonjeff, “Planning and Design of Airports”, Mc Graw Hill Publications, 2008.
4. Chadula, S.P. “Railway Engineering–A text book of Transportation Engineering”, S.Chand & Co. Ltd. (2001).
5. Relevant NPTEL Courses.

DISASTER MANAGEMENT

CIV 413 B

Instruction: 3 Lectures / week

End Exam: 3 Hours

Credits: 3

Sessional Marks: 40

End Exam Marks: 60

Course Objectives:

From this course students will learn the following

1. Learn about the nature of disasters
2. Understand about administrative management of disasters
3. Learn about the importance of pre disaster measures

SYLLABUS

UNIT – I

8 Periods

Disasters: Nature and extent of disasters, Natural disasters like earthquakes, floods, drought, volcanoes, forest fires, hazards, landslides, tsunami, etc. Manmade disasters like chemical and industrial hazards, nuclear hazards, fire hazards etc.

UNIT – II

8 Periods

Disaster Management: Administrative setup and organization, Risk management, strategies of risk reduction, disaster resilience, emergency management programme, Information management.

UNIT – III

8 Periods

Disaster Monitoring & Mitigation: Relief measures (short-term and long-term), financing the relief expenditure, legal aspects, rescue and refugee operations, disaster recovery, mitigation measures.

UNIT – IV

8 Periods

Hazard Analysis: Training of personnel, Emergency facilities and equipment necessary, public awareness creation, Impact of disasters on environment and poverty, health hazards of disasters.

UNIT – V

8 Periods

Case studies: Detailed case studies on Earth-quakes, floods, landslides, industrial hazards and fire accidents in India, INCOIS (Hyd), NIDM (Delhi).

TEXT BOOKS

1. Gupta, H.K. (2003), "Disaster management", University Press, New Delhi, 3rd Edition.
2. Singh, R.B (2000), "Disaster management", Rawat Publications, New Delhi, 2nd edition.

REFERENCES

1. Krishnamurthy, R.R (2002), “Disaster Management”, University Press, New Delhi, 1st edition.
2. Seetharaman, S (1999), “Construction Engineering and Management”, Umesh Publications, New Delhi, 4th Edition.
3. Gupta, M.C (2002), “Manuals on Natural Disaster management in India”, National Centre for Disaster Management, IIPA, New Delhi,.
4. Relevant NPTEL Courses

EARTH AND EARTH RETAINING STRUCTURES

CIV 413 C

Instruction : 3 Lectures / week

End Exam : 3 Hours

Credits : 3

Sessional Marks : 40

End Exam Marks : 60

Course Objective:

The course contents enable the students to understand the earth pressure concepts and design principles of retaining structures.

SYLLABUS

UNIT – I

8 Periods

Earth Pressure: Basic concepts, Rankine and Coulomb earth pressure theories, Determination of active and passive pressures: Culmann's Graphical method, logarithmic spiral methods, friction circle method. Consideration of surcharge, seepage, stratification, earth quake, type of backfill, wall friction and adhesion.

UNIT – II

8 Periods

Rigid Retaining Walls: Uses, types, stability and design principles of retaining walls, backfill drainage, settlement and tilting.
Sheet Pile Walls: Types, Design of cantilever sheet pile walls in granular and Cohesive soils; Design of anchored sheet pile walls by free and fixed earth support methods, Rowe's theory of moment Reduction, Design of anchors, Diaphragm Walls – construction, trench cutter.

UNIT – III

8 Periods

Braced excavations: Types of sheeting and Bracing systems, lateral earth pressure on sheeting in sand and clay, Design components of braced cuts. Cellular cofferdams: Types – Diaphragm and Circular type, Design by TVA method. Stability of cellular cofferdams, cellular cofferdams in rocks and soils.

UNIT – IV

8 Periods

Earth and Rock fill dams: Earth dams: Selection of Site, types of earthen dams, design criteria, stability analysis: upstream and down stream for steady seepage, rapid draw down, end of construction; Seepage, Uplift Control, filters and drains.

UNIT – V

8 Periods

Construction and Causes of Failure of earth dams: Construction - Hydraulic, Seepage and Structural Failure; Instrumentation and performance observations in earth dams. Rock Fill Dams: Types, Design parameters, Advantages over other types of dams

TEXT BOOKS

1. Gopal Ranjan & ASR Rao (2016), "Basic & Applied soil mechanics", New Age International Publishers, 3rd Edition
2. Arora, K.R. (2015), "Soil Mechanics and Foundation Engineering", Standard Publishers, New Delhi, 7th Edition.
3. Bharat Singh and Sharma, H. D. (1976), "Earth and Rockfill Dams", Sarita Prakashan, India.

REFERENCES

1. Rowe, R.K. (2001), “Geotechnical and Geoenvironmental Engineering Handbook”, Springer, New York.
2. Narasinga Rao, B.N.D. (2015), “Soil Mechanics and Foundation Engineering”, Wiley Publishers, New Delhi, 1st Edition.
3. Taylor, D.W. (1967), “Fundamentals of Soil Mechanics”, John Wiley, New York.
4. Das, B. M. (2016), “Principles of Foundation Engineering”, Cengage learning, Boston, 8th edition.
5. Purushothama Raj, P. (1995), “Geotechnical Engineering”, Tata McGraw Hill, New Delhi.
6. Hsai-Yang Fang (2004), “Foundation Engineering Handbook”, CBS publishers & distributors, New Delhi, 2nd edition.
7. Clayton, C.R.I., Rick, I.W. and Andrew, J.B. (2014), “Earth pressure and earthretaining structures”, CRC press, Florida, 3rd edition.
8. Relevant NPTEL Courses

DESIGN OF RCC BRIDGES

CIV 413 D

Instruction: 3 Lectures / week

End Exam: 3 Hours

Credits: 3

Sessional Marks: 40

End Exam Marks: 60

Prerequisite:

Design of Concrete Structures

Course Objective:

1. Familiarize Students with different types of Bridges and IRC standards
2. Equip student with IRC standards
3. Equip student with concepts and design of Slab Bridges
4. Equip student with concepts and design of T Beam Bridges
5. To familiarize student with the knowledge of bridge sub structure

SYLLABUS

UNIT – I

12 Periods

Introduction: Components of Bridges – Classification – Importance of Bridges -Selection of Bridge site – Economical span – Location of piers and abutments – Choice of bridge type: Subsoil exploration – Scour depth. Importance of Bearings

UNIT – II

12 Periods

Loading Standards: Types of loading - Dead load - Live load (IRC Standards) - Impact Load - Tractive forces - Centrifugal forces - wind forces – temperature stresses – Seismic forces.

UNIT – III

12 Periods

Slab bridges: Introduction- Wheel load on slab- effective width method (IS Method) - slabs supported on two edges- cantilever slabs- dispersion length

UNIT – IV

12 Periods

Beam & Slab Bridge (T-Beam Girder Bridge): General features – Design of interior panel of slab – Pigeaud’s method – Courbon’s method – Analysis and design of T-beam longitudinal girder subjected to IRC loading – Analysis and design of Cross Girder

UNIT – V

12 Periods

Substructure: General features of Abutments – forces acting on abutments – Design and Stability analysis of abutments. General features - Types of piers – Forces acting on piers – Design and Stability analysis of piers. Types of Bearings.

TEXT BOOKS

1. Johnson victor D, “Essentials of Bridge Engineering”, 7th Edition, Oxford, IBH publishing Co., Ltd., 2006.
2. Ponnuswamy, S. (2008), “Bridge Engineering” Mc Graw Hill Inc.

REFERENCES

1. Krishna Raju N., “Design of Bridges”, 4th Edition, Oxford and IBH Publishing Co., Ltd., 2008.
2. Jagadish T.R. & M.A. Jayaram, “Design of Bridge Structures”, 2nd Edition, 2009
3. Relevant – IRC & Railway bridge Codes.
4. Relevant NPTEL Courses.

RS & GIS APPLICATIONG IN CIVIL ENGINEERING

CIV 413 E

Instruction: 3 Lectures / week

End Exam: 3 Hours

Credits: 3

Sessional Marks: 40

End Exam Marks: 60

Prerequisites:

Nil

Course Objectives:

1. To Learn about the principles of remote sensing and Electromagnetic radiations
2. To know about satellites, satellite parameters
3. To learn about the image interpretation and processing techniques
4. To study about GIS and various data models.
5. To know the applications of remote sensing and GIS in civil engineering projects.

SYLLABUS

UNIT – I

9 Periods

Remote Sensing: Principle - Electro-magnetic energy, spectrum - EMR interaction with atmosphere – Atmospheric Windows and its Significance – EMR interaction with Earth Surface Materials – Spectral Signature and Spectral Signature curves for water, soil and Earth Surface, Energy sources and radiation principles.

UNIT – II

9 Periods

Satellites: Classification – Satellite Sensors – satellite and sensor parameters - Resolution – Types of sensor systems used in RS, RS satellites, land sat, spot, IRS, IKONOS, QUICKBIRD., RS data products.

UNIT – III

9 Periods

Image interpretation: Elements of image interpretation, concepts of digital image processing image Rectification and Restoration, Image enhancement, Image classification. Characteristics of different platforms, Radar, LIDAR, SAR, MODIS, AMSRE, Sonar remote sensing systems.

UNIT – IV

9 Periods

GIS: Introduction, GIS overview, Introduction to GIS - elements of GIS, Computer hardware - Software. Data Input, Verification, data storage and database management and output applications, Map Overlay - Vector and raster data model , overlay operation Errors and quality control.

UNIT – V

9 Periods

RS and GIS in civil engineering projects: Soil mapping and characteristics. Application in water resource engineering. Environmental pollution monitoring. Regional and urban mapping, planning systems and waste disposal sites.

TEXTBOOKS

1. Lillesand, T.M. & Kiefer R.W. (2007), “Remote Sensing and image interpretation”, John Wiley & Sons (Asia), Newyork.

REFERENCES

1. Anji Reddy, M. (2011), “Remote sensing and Geographical information system”, B.S Publications.
2. Burrough, P. A. (1998), “Principles of Geographical information systems for land resource assessment”, Clarendon Press, Oxford, 2nd Edition.
3. Stan Aronoff, (1991), “Geographic Information Systems - A Management Perspective”, WDL Publications, Ottawa, Canada, Reprint Edition.
4. Kennie, J.J.M., Matthews, (2005), “Remote sensing in Civil Engineering”, Mc-Millan.
5. Floyd F. Sabins, (2005), “Remote Sensing Principles and Interpretation”, Jr. W.H. Freeman & Co., 3rd Edition.
6. Relevant NPTEL Courses.

PROFESSIONAL ELECTIVE - III

PRESTRESSED CONCRETE

CIV 414 A

Instruction: 3 Lectures / week

End Exam: 3 Hours

Credits: 3

Sessional Marks: 40

End Exam Marks: 60

Pre-requisites:

Strength of materials, Concrete technology, Reinforced Concrete Structures

Course objectives:

The objective of this course is to

1. To know the different pre-stressing systems and the losses in pre-stressing
2. To analyse and design the sections for flexure and shear.
3. To evaluate the stresses at the end blocks of a pre-stressed member

SYLLABUS

UNIT – I

12 Periods

Introduction:

Historic development – General principles of pre-stressing – pre-tensioning and post tensioning – Advantages and limitations of pre-stressed concrete – Materials – High strength concrete and high tensile steel and their characteristics.

Prestressing Methods: I.S.Code provisions, Methods and Systems of Pre-stressing; Pre-tensioning and post tensioning methods – Different systems of pre-stressing like Hoyer system, Magnel Blaton system, Freyssinet system and Gifford Udall System.

UNIT – II

12 Periods

Losses of Prestress:

Loss of pre-stress in pre tensioned and post tensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage bending of member and frictional losses.

UNIT – III

12 Periods

Analysis of Sections for Flexure:

Analysis of sections for flexure; Elastic analysis of concrete beams pre-stressed with straight, Concentric, eccentric, bent and parabolic tendons.

UNIT – IV

12 Periods

Design of Sections for Flexure and Shear:

Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure, shear, and principal stresses.

UNIT – V

12 Periods

Analysis of End Blocks:

Analysis of end Blocks by Guyon's method and Magnel method, Anchorage zone stress – Approximate method of design – Anchorage zone reinforcement – Transfer of pre-stress in pre-tensioned members.

TEXT BOOKS

1. Krishna Raju N. (2012) "Prestressed Concrete", Tata Mc.Graw Hill Publications, 5th Edition.
2. Ramamrutham S. (2015) Prestressed Concrete, Dhanpatrai Publications, 4th Edition.

REFERENCES

1. Lin T.Y, and Ned H. Burns, (2010) "Design of Prestressed Concrete Structures", Wiley Publications
2. Rajagopalan. N (2006) "Prestressed Concrete", Narosa publications, 2nd Edition.
3. I.S. 1343-2012 "Indian Standard Code of Practise for Prestressed Concrete", Bureau of Indian Standards.
4. Relevant NPTEL Courses.

ADVANCED FLUID MECHANICS

CIV 414 B

Instruction : 3 Lectures / week

End Exam : 3 Hours

Credits : 3

Sessional Marks : 40

End Exam Marks : 60

Prerequisites:

Fluid Mechanics – I & Fluid Mechanics – II

Course Objectives:

1. To develop an insight into engineering problems related to fluids.
2. Student is expected to learn about the viscous effects on fluid motion to solve complex problems in engineering.
3. Student shall be able to know different types of fluid flows and apply the principles of conservations of mass, momentum and energy.

SYLLABUS

UNIT – I

9 Periods

Viscous Effects on Fluid Motion: Navier-Stokes Equations (No Derivation) – N.S. equations for standard cases of Plane Two Dimensional and Axisymmetric Flows. Steady Flow between Parallel Plates- Couette and Poiseuille Flows- Unsteady Laminar Flow Past a Flat Plate, Flow through a Circular Annulus- Flow without and with Pressure Gradient- Hagen-Poiseuille Equation, Relationship between Friction factor and Reynolds Number for Laminar Flow through Pipes.

UNIT – II

9 Periods

Drag & Lift: Drag of immersed bodies - Variation of Drag Coefficient with Reynolds Number; Resistance diagram for bodies of revolution- Drag Coefficient of Practical Bodies. Effect of Circulation in Irrotational Flow- Computation of Lift Force- Lift on Airfoil- Lift Coefficient and its Variation with Angle of Attack- Jukowsky Profile- Polar Diagram- Stall - Induced Drag

UNIT – III

9 Periods

Uniform Flow in Open Channels: Uniform Flow Computation- Conveyance of a Channel Section – Section Factor and Hydraulic Exponent. Flow Characteristics in a Closed Conduit with Open Channel Flow. Determination of Normal Depth and Velocity. Design of Channels for Uniform Flow – Design of Non-erodible Channels (Rectangular & Trapezoidal Sections only). Canal Transitions- Change of Depth in Channels with (a) Change in Cross-section and (b) Hump in the Bed- Control Sections- Venturi Flume and Parshall Flume.

UNIT – IV

9 Periods

Varied Flow in Open Channels: Definition of G.V.F. and Derivation of Governing Equation- Mild, Steep, Critical, Horizontal and Adverse Slopes- Classification of G.V.F. Profiles- Backwater and Drawdown Curves- G.V.F. Profiles for Channels with Changing Slopes. Computation of G.V.F. Profiles- Graphical Integration Method and method of Direct Integration

(Procedures Only), Direct Step and Standard Step Methods – Computation of G.V.F. Profiles in rectangular channels using Direct and Single Step methods (Simple Slope cases only).

UNIT – V

9 Periods

Unsteady Flow in Open Channels: Gradually Varied Unsteady Flow –Dynamic Equation for Unsteady Flow – Monoclinical Rising Wave –Dynamic Equation for Uniformly Progressive Flow. Wave Profile of Uniformly Progressive Flow- Dam Break Problem - Wave Propagation.(Solution of Unsteady-flow equations and Spatially varied Unsteady Flow are excluded). Rapidly Varied Unsteady Flow - Uniformly Progressive Flow – Moving Hydraulic jump – Positive and Negative Surges–Pulsating Flow.

TEXT BOOKS

1. Modi, P.N.& Seth, S.M. (2009),“Fluid Mechanics and Hydraulic Machinery”, Standard Book House, New Delhi, 19th Edition.
2. Subramanyam, K. (2008), “Flow in Open Channels”, McGraw Hill Education, New Delhi, 3rd Edition.

REFERENCES

1. Jain, A.K. (2008), “Fluid Mechanics”, Khanna Publishers, New Delhi, 4th Edition.
2. Kumar, K.L., Chand, S. & Co. (2008), “Engineering Fluid Mechanics”, Eurasia Publishing House (P) Ltd, New Delhi, 8th Edition.
3. Chow, V.T. (2009), “Open-Channel Hydraulics”, The Blackburn Press, Caldwell, NJ USA, 1st Edition
4. White, F. M. (2011) “Fluid Mechanics”, Tata McGraw Hill Publication, New Delhi, 7th Edition.
5. Relevant NPTEL Courses.

DESIGN OF RCC & STEEL STRUCTURES

CIV 414 C

Instruction : 3 Lectures / week

End Exam : 3 Hours

Credits : 3

Sessional Marks : 40

End Exam Marks : 60

Prerequisites:

Strength of materials, Concrete technology, Reinforced Concrete Structures, Steel Structures

COURSE OBJECTIVES:

From this course students will learn the following

1. To learn how to design RCC water tanks and Concrete bridges
2. To learn how to design plate girders
3. To analyse beams and frames

SYLLABUS

UNIT – I

12 Periods

Introduction To Working Stress Method: Introduction – Design for bending –Analysis and design of singly reinforced and doubly reinforced beams.

Rectangular RC Water Tanks-I: Introduction – General design requirements according to Indian standard code of practice – Design of on ground and underground water tanks.

UNIT – II

12 Periods

Rectangular RC Water Tanks-II: Introduction – General design requirements according to Indian standard code of practice –Design of over head water tanks.

UNIT – III

12 Periods

RC Bridges: Components of a bridge in sub structure and super structure. Classification of bridges. Loads on Highway bridges, IRC loading, Design of slab bridge.

UNIT – IV

12 Periods

Steel Bridges: Bridges: Classification, Loadings, Types of bridges – Deck Type and Through Type, Design of Through Type Bridge - Stringer, Cross Girders.

Bearings & Expansion Joints: Types of bearings, plate bearing, Rocker bearing, Roller bearing, Knuckle pin bearing. Expansion Joints: Introduction and classification.

UNIT – V

12 Periods

Plastic analysis: Introduction, Upper and Lower bound theorems, Uniqueness theorem, Shape factor, Load factor; Collapse load for fixed and continuous beams, Collapse load for a frame of single bay single storey frame.

TEXT BOOKS

1. Punmia, B.C , Ashok Kumar Jain and Arun Kumar Jain,(2016) “Limit State Design of Reinforced Concrete ” Laxmi Publications (P) Ltd. New Delhi, 16th Edition
2. Duggal, S.K. (2014) “Limit State Design of steel structures”, McGraw Hill Education Private Ltd.

REFERENCES

1. Varghese, P.C., (2009) “ Advanced Reinforced Concrete Design”, Prentice Hall of India Pvt.Ltd, New Delhi
2. Ramamrutham, S. (2015) “Design of Reinforced Concrete Structures”, Dhanpat Rai publishing company (P) Ltd.
3. Pillai, S.U. & Devdas Menon, (2009) “Reinforced concrete design”, Tata McGraw Hill. New Delhi, Third Edition.
4. Jain, A.K., (2016) “Reinforced Concrete Design”, Charotor Publications. Anand Gujarat, 16th Edition
5. Subramanian, N. (2011) “Design of Steel structures”, Oxford University Press.
6. Relevant Indian Standard Codes
7. Relevant NPTEL Courses

WATER RESOURCES ENGINEERING - II

CIV 414 D

Instruction : 3 Lectures / week

End Exam : 3 Hours

Credits : 3

Sessional Marks : 40

End Exam Marks : 60

Prerequisites:

Fluid Mechanics – II; Water Resources Engineering - I

Course Objective:

To provide the necessary background for understanding the storage of water, various Head, Regulation and Cross drainage works and Hydel Power production.

SYLLABUS

UNIT– I

12 Periods

Storage Works: Classification of dams, factors governing selection of type of dam, selection of site, preliminary investigations.

Gravity Dams: Types, Forces acting on a gravity dam, stability criteria, modes of failure, elementary and practical profiles, stability analysis, stress analysis, Construction joints, openings in dams - galleries, foundation treatment of gravity dam.

UNIT– II

12 Periods

Earth Dams: Types, foundation for earth dams, causes for failure of earth dams, criteria for safe design, phreatic line, seepage analysis – seepage control through body and foundation

Spillways: Essential requirements, spillway capacity, components, types of spillways and their working, design of ogee spillway, spillway crest gates, energy dissipation below spill way, scour protection, use of hydraulic jump as energy dissipater.

UNIT – III

12 Periods

Diversion Head Works: Location and components, effects of construction of weirs on permeable foundation, Bligh's, Lane's and Khosla's theories, weirs and barrages, weirs on permeable foundations, design of weir, silt control devices.

UNIT – IV

12 Periods

Regulation Works: Canal falls, definition, necessity and location, classification of falls, design principles of notch fall (Sarda Type & Trapezoidal Type only), canal head regulator, cross regulator and off-take alignment.

Cross Drainage Works: Types, factors affecting the suitability of each type, classification, design principles of Aqueduct (Type-III).

UNIT – V

12 Periods

Water Power Engineering: Development of hydro power in India, assessment of available power, utilization factor, load factor, diversity factor, storage and pondage, types of hydro power schemes, components of hydel schemes – forebay, intake structure, trash racks, water hammer, surge tanks, substructure and super structure of power house.

River Engineering: Classification of Rivers, River Training and its objectives, Classification of River Training Works, Methods for River Training, Marginal Embankments or Levees, Guide Banks or Guide Bunds, Groynes or Spurs, Cut-offs, Bank Pitching and Launching Aprons, Pitched Islands, Miscellaneous Methods.

TEXT BOOKS

1. Punmia, B.C. and Lal Pande B.B. (2021), “Irrigation and Water Power Engineering”, Laxmi Publications Pvt. Ltd., New Delhi, 12th edition.
2. Garg, S.K. (2018), Irrigation Engineering and Hydrology Structures, Khanna Publishers, Delhi, 16th Edition.

REFERENCES

1. Modi, P.N. (2004), “Irrigation, Water Resources and Water Power Engineering”, Standard Book House, Delhi, 6th Edition.
2. Relevant NPTEL Courses

SOIL DYNAMICS AND MACHINE FOUNDATION

CIV 414 E

Instruction : 3 Lectures / week

End Exam : 3 Hours

Credits : 3

Sessional Marks : 40

End Exam Marks : 60

Prerequisites:

Geotechnical Engineering-II

Course Objectives:

From this course students will learn the following

1. To understand the fundamentals of soil dynamics
2. To know the behaviour of the machine foundations and its design
3. To understand the techniques of isolation

SYLLABUS

UNIT – I

9 Periods

Theory of Vibrations: Free and forced vibrations with and without damping for single mass system with single degree freedom, Logarithmic Decrement and Damping Ratio, Principles of Design of Vibration measuring Devices, Transmissibility of force, vibrations of Two degree freedom system, vibrations of Systems under transient loads.

UNIT – II

9 Periods

Natural frequency of foundation soil system- Barkan's Method, Pressure Bulb Concept, Pauw's Analogy, Tschebetorioff's concept of reduced natural Frequency

UNIT – III

9 Periods

Dynamic Soil Properties: Tests for determination of dynamic soil properties - Cyclic Plate load test, Block vibration test, Up Hole, down Hole and Cross Hole wave Propagation tests, Hammer Test, Resonant Column Test, Seismic Reflection and Refraction tests.

UNIT – IV

8 Periods

Design of Machine Foundations: Types of Machine Foundations, design criteria, Degrees of Freedom of Block foundation, Analysis of Block foundations under sliding, rocking, yawing and coupled motions, Design Aspects and Construction details of foundations for reciprocating and Impact machines.

UNIT – V

5 Periods

Vibration Isolation: Vibration Isolation - Passive and active isolation - use of springs and damping materials construction aspects.

TEXT BOOKS

1. Narasinga Rao, B.N.D.(2015), Soil Mechanics and Foundation Engineering, Chapter-22, Wiley Publishers
2. Srinivasulu, P. and Vaidyanathan, C.V. (2017), “Hand-book of machine foundations”, Structural Engineering research Centre.

REFERENCES

1. Swami Saran (1999), Soil Dynamics and Machine Foundations, Galgotia Publications Pvt Ltd..
2. B M Das, (1992),”Principles of Soil Dynamics”, Thomsons Engineering.
3. Shamsheer Prakash, Gopal Ranjan and Swami Saran (1979), Analysis and design of Foundations and Retaining Structure,M/s Saritha Prakashan., Meerut.
4. N. S. V. Kameswara Rao, (1998),”Vibration Analysis and Foundation Dynamics”, Wiley New Delhi.
5. Richart F.E., Hall, J.R. Woods, R.D. (1970), Vibrations of soils and Foundation by Richart Hall, Woods Prentice Hall Inc., New Jersey.
6. Relevant I.S. Codes.
7. Relevant NPTEL Courses.

INTRODUCTION TO FINITE ELEMENT METHODS

CIV 414 F

Instruction : 3 Lectures / week

End Exam : 3 Hours

Credits : 3

Sessional Marks : 40

End Exam Marks : 60

Course Objective:

1. To study the strain- displacement and linear constitutive relation.
2. To understand the numerical techniques applied in FEM Establishment of element stiffness and load vector.
3. To study about the 2-D isoperimetric concepts.

SYLLABUS

UNIT – I 12 Periods

Introduction Of Finite Element Method – Concept of an element – Various element shapes.

UNIT – II 12 Periods

Displacement Models – Element stresses and strains – Direct formulations of element stiffness and loads.

UNIT – III 12 Periods

Plane stress/strain triangular elements – Quadrilateral elements – Modelling and mesh refinement.

UNIT – IV 12 Periods

Construction of stiffness matrix and loads – boundary conditions.

UNIT – V 12 Periods

Finite Element modelling and solution techniques – symmetry in Finite Element method– nature of Finite Element method solution – errors– convergence and adaptively.

TEXT BOOKS

1. Krishnamurthy, C.S, (1995), “Finite Element Analysis Theory & Programming”, McGraw-Hill.
2. Bhavikatti, S.S. (2015), “Finite Element Analysis”, New Age International Pvt. Ltd

REFERENCES

1. Zienkiewicz, O.C., and Taylor, R.L., (2002), “The Finite Element method”, Butterworth Heinemann, New Delhi.
2. Cook, R.D., (2002), “Concept and Applications of Finite Element Analysis”, John Wiley & Sons
3. Chandrakant. S. Desai, and John. F. Abel.,(2002), “Introduction to the Finite Element method”, CBS Publishers & Distributors, New Delhi.
4. Chandraputla, T.R. and Belegundu A.D., (2003), ”Introduction to Finite Elements in Engineering”, Prentice Hall, Indian, Edn.
5. Relevant NPTEL Courses

ADVANCED TRANSPORTATION ENGINEERING

CIV 414 G

Instruction : 3 Lectures / week

End Exam : 3 Hours

Credits : 3

Sessional Marks : 40

End Exam Marks : 60

Prerequisite:

Nil

Course Objective:

1. To study the different elements and their functions in layout of port and harbour.
2. To learn the various tunneling methods and its applications.
3. To study the different distresses and highway maintenance of pavements.
4. To study the traffic engineering principles and components of ITS.

SYLLABUS

UNIT – I

9 Periods

Dock & Harbour Engineering: Layout of Port components – Functions – Classification of Ports – Site selection – breakwaters - Natural Phenomenon – Tides, Winds, Waves, Currents – Drift – warehouses - Navigational aids.

UNIT – II

9 Periods

Tunnel Engineering: Introduction - Alignment of tunnels – Cross-section of tunnels – Construction methods of Tunnels – Tunnel lining – Ventilation – Drainage – Muck disposal.

UNIT – III

9 Periods

Highway Maintenance: Pavement failures, causes, failures in flexible pavements and rigid pavements. Maintenance of highways, routine maintenance, periodic maintenance, special repairs.

UNIT – IV

9 Periods

Traffic Engineering Principles: components of traffic stream: flow-speed - Density, measurement and analysis, q-k-v relationships, design hourly volume, concept of EPCU, capacity and level of service, Parking studies and accident studies.

UNIT – V

9 Periods

Intelligent Transportation Systems: Components of ITS, Traffic Management - Incident Management, Advanced vehicle control and safety systems, Electronic toll collection, Traveller Information System, Benefits and costs of ITS.

TEXT BOOKS

1. Seetharaman “Dock & Harbour Engineering”, Umesh Publications, 1st Edition, 2008.

2. Rangwala, K. “Railway, Bridge and Tunnel Engineering”, Charotar Publishing House Pvt. Ltd. Second Edition (2016)
3. Khanna, S. K. & Justo, C. E. G. (1973), “Highway Engineering” Nemchand & Brothers, Roorkee, (3rd Edition).
4. Kadiyali, L.R. Traffic Engineering, Khanna Publishers, 7th edition 2007.
5. Pradeep Kumar Sarkar “Intelligent Transport System” PHI Learning Pvt. Ltd. (2017).

REFERENCES

1. Subramanian, K.P. (2003), “Highway, Railway, Airport and Harbour Engineering” Scitech Publications (India) Pvt. Ltd.
2. Srinivasan, Docks & Harbour Engineering, Charotar Publishing House, 7th edition, 1983.
3. Relevant NPTEL Courses.

PROFESSIONAL ELECTIVE - IV

WATERSHED MANAGEMENT

CIV 415 A

Instruction: 2 Lectures & 1 Tutorial / week

End Exam: 3 Hours

Credits: 3

Sessional Marks: 40

End Exam Marks: 60

Prerequisites:

Water Resources Engineering – I

Course Objectives:

From this course students will be able to

1. Understand the concept of watershed management
2. Identify the characteristics of watershed
3. Study the principle of soil erosion and methods controls soil erosion
4. Study different techniques for water harvesting
5. Study different factors responsible for land management

SYLLABUS

UNIT – I

8 Periods

Introduction: Concept of watershed development, objectives of watershed development, need for watershed development, Integrated and multidisciplinary approach for watershed management.

UNIT – II

8 periods

Characteristics of Watersheds: Size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socio-economic characteristics, basic data on watersheds.

UNIT – III

8 Periods

Principles of Erosion: Types and causes of erosion, factors affecting erosion, estimation of soil loss due to erosion- Universal soil loss equation.

Measures to Control Erosion: Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, check dams, rock-fill dams, Gabion.

UNIT – IV

8 Periods

Water Harvesting: Techniques of rain water harvesting- rain water harvesting from roof top, surface flow harvesting, subsurface flow harvesting, stop dams, farm ponds and dugout ponds, percolation tanks.

UNIT – V

8 Periods

Land Management: Land use and Land capability classification, management of forest, agricultural, grassland and wild land, land grading operation, Reclamation of saline and alkaline soils.

TEXT BOOKS

1. Murthy, J. V. S, (2006) “Watershed Management” New Age International Publishers, New Delhi
2. Murthy, V.V.N (2007) “Land and Water Management” Kalyani Publications, New Delhi

REFERENCES

1. Das M.M. and Saikia M.D (2013) “Watershed Management”, PHI Learning Pvt. Ltd
2. Wurbs R A and James R A (2002) “Water Resource Engineering”, Prentice Hall Publishers Upper Saddle River, N.J.
3. Black P E (1996) “Watershed Hydrology” Prentice Hall, Upper Saddle River, N.J.
4. Relevant NPTEL courses.

ADVANCED BUILDING CONSTRUCTION

CIV 415 B

Instruction : 2 Lectures & 1 Tutorial / week

End Exam : 3 Hours

Credits : 3

Sessional Marks : 40

End Exam Marks : 60

Course Objectives:

From this course students will learn the following

1. Learn about advanced developments in building constructions
2. Understand the role of technology in building constructions
3. Learn about the modern electrical installations

SYLLABUS

UNIT – I

8 Periods

Earthquake resistant buildings: Occurrence of earthquakes, plate-tectonic theory, seismic waves, magnitude and intensity, seismic zones of India, plan & vertical configurations of buildings, shear walls, dampers, base-isolation, strong column-weak beam concept.

UNIT – II

8 Periods

Fire resistant buildings: Introduction, Importance of fire resistance to buildings, ISO 834 standard heating conditions, grading or classifications, effect of high temperature on steel and concrete, effect of high temperature on different types of structural members.

Fire protection of buildings: Fire zones, general requirements, exit requirements, requirements of residential, educational, business, industrial and storage buildings

UNIT – III

8 Periods

Acoustic buildings: planning and design against outdoor and indoor noise for - residential, educational, office, hostel and industrial buildings.

Thermal Insulated buildings: Introduction, designating thermal properties, Insulation materials, construction techniques for thermal insulation, super Insulation.

UNIT – IV

8 Periods

Smart buildings: materials used in smart systems, different types of smart materials, characteristics and behaviour of smart materials, Components of smart systems, system features and interpretation of sensor data, features of control systems.

UNIT – V

08 Periods

Electrical installations: general requirements, planning of electrical installations for earthing, tele-communication and other miscellaneous services

Installations of lifts & Escalators: essential requirements, design considerations for lifts and escalators

REFERENCES

1. Pankaj Agarwal (2011), “Earthquake Resistant Design of structures”, Prentice Hall of India, New Delhi, 2nd edition.
2. Varghese,P.C (2009), “Advanced Reinforced Concrete Design” , Prentice Hall of India, New Delhi, 2nd edition.
3. SP-7 (1983), National building code of India,Group-1, part-4&8
4. Srinivasan, A. V and Michael McFarland, D (2000), “Smart Structures: Analysis and Design”, Cambridge University Press, New Delhi, 1st edition.
5. William Spence, P (2012), “Construction materials, methods and Techniques”, Cengage learning India pvt ltd, New Delhi, 2nd edition.
6. Relevant NPTEL Courses.

EARTHQUAKE ENGINEERING

CIV 415 C

Instruction : 2 Lectures & 1 Tutorial / week

End Exam : 3 Hours

Credits : 3

Sessional Marks : 40

End Exam Marks : 60

Prerequisite:

Course Objective:

1. To create a strong understanding on application of single degree and multi-degree of freedom systems.
2. To impart the knowledge on causes and effects of earthquakes.
3. To familiarize with seismic codal and detailing provisions.

SYLLABUS

UNIT – I

12 Periods

Introduction: Earthquakes, Epicenter, Hypocenter and earthquake waves, Measurement of ground motion, Seismic Regions, Intensity and Iso-seismals of an earthquake, Magnitude and energy of an earthquake, Consequences of earthquakes, Seismic zones.

UNIT – II

12 Periods

Vibrations: Theory of vibrations – Lumped mass and continuous mass systems – Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion – Un damped and damped free vibration, Multiple Degree of Freedom (MDOF) Systems Formulation of equations of motion – Free vibration – Determination of natural frequencies of vibration and mode shapes

UNIT – III

12 Periods

Plan Configurations – Torsion Irregularities – Re-entrant corners – Non-parallel systems – Diaphragm Discontinuity – Vertical Discontinuities in load path – Irregularity in strength and stiffness – Mass Irregularities – Vertical Geometric Irregularity – Proximity of adjacent buildings.

UNIT – IV

12 Periods

Ductile Detailing: Ductility of R.C structures- Confinement- detailing as per IS-13920-1993- moment redistribution – principles of design of beams, columns – beam column joints – soft story concept.

UNIT – V

12 Periods

Cyclic loading behaviour of RC and steel elements, Base isolation, Retrofitting and restoration of buildings subjected to damage due to earthquakes, effects of earthquakes, factors related to building damages due to earthquake, methods of seismic retrofitting, restoration of buildings.

TEXT BOOKS

1. Pankaj Agarwal and Manish Shri Khande, Earthquake Resistant Design of Structures, Prentice Hall of India, 2007, New Delhi.

REFERENCES

1. Chopra A.K., “Dynamics of Structures”, 5th Edition, Pearson Education, Indian Branch, Delhi, 2007
2. Duggal, S.K. “Earth Quake Resistant Design of Structures”, Oxford university Press, 1st Edition, 2012
3. IS Codes: IS: 1893, IS: 4326 and IS:13920, Bureau of Indian Standards, New Delhi.
4. Relevant NPTEL Courses.

ENVIRONMENTAL IMPACT ASSESSMENT

CIV 415 D

Instruction : 2 Lectures & 1 Tutorial / week

End Exam : 3 Hours

Credits : 3

Sessional Marks : 40

End Exam Marks : 60

Prerequisites:

Environmental Sciences.

Course objectives:

The objectives of this course are to

1. To study about the basics, methods of assessment and importance of Environmental Impact Assessment.
2. To know about the Environmental Management and Prediction Methods
3. To study about the Environmental Management Plan
4. The broad education necessary to understand the impact of engineering solutions in global economic, environmental and social context

SYLLABUS

UNIT – I

9 Periods

Introduction: Introduction to EIA. Definition of EIA and EIS, preparation of EIS, Elements of EIA, Agency Activities, Environmental setting.

UNIT – II

9 Periods

Environmental attributes: Environmental attributes, air, water, soil, ecology, noise Socio-Economic aspects, Culture and human aspects (Human Settlements-Rehabilitations)

UNIT – III

9 Periods

Environmental impacts: Identification, measurement, Aggregation, Secondary and Cumulative Impacts.

UNIT – IV

9 Periods

Impact Assessment Methodologies: Criteria for selection of methodology, impact assessment methodologies, procedure for reviewing environment impact statement.

UNIT – V

9 Periods

Case studies: Economic impact analysis, energy production impact analysis, cost benefit analysis, Environmental impact mitigation and control measures.

TEXT BOOKS

1. Ravi Jain, Urban, L.V., Gary S. Stacey and Harold Balbach (2001), "Environmental Impact Analysis", McGraw Hill Professional, New York, 2nd Edition.
2. Anjaneyulu, Y., Valli Manickam (2011), "Environmental Impact Assessment Methodologies", B.S. Publication, New Delhi, 2nd Edition.

REFERENCES

1. Larry W. C. (1996), “Environmental Impact Analysis”, Mc. Graw Hill Publishers, New York, 2nd Edition.
2. John Glasson, Riki Therivel and Andrew Chadwick. (2005), “Introduction to Environmental Impact Assessment” Routledge Publication, London, 3rd Edition.
3. Relevant NPTEL Courses.

AIR POLLUTION CONTROL

CIV 415 E

Instruction : 2 Lectures & 1 Tutorial / week

End Exam : 3 Hours

Credits : 3

Sessional Marks : 40

End Exam Marks : 60

Prerequisites:

Environmental Sciences

Course Objectives:

The objective of this course is to:

1. To impart the knowledge on air pollution.
2. To analyse causes and effects of air pollution.
3. To familiarize with strategic planning for control of air pollution.

SYLLABUS

UNIT – I

9 Periods

Air Pollution and its definition, Factors influencing air pollution, Classification of pollutants particulates, Sources of pollution, Air qualities standards, effects - Global warning

UNIT – II

9 Periods

Meteorology: Wind rose diagrams, lapse rates, mixing depth, atmospheric dispersion, plume behaviour, Effective stack height, stack monitoring and ambient air quality monitoring.

UNIT – III

9 Periods

Air Pollution effects: On human beings, animals, plants and materials, Air Pollution Episodes in India (Bhopal, Kanpur, Delhi and Agra) and abroad (London, Beijing).

UNIT – IV

9 Periods

Control of air pollutants (Gaseous): Control of CO_x, NO_x - setting chamber, cyclones, electrostatic precipitators, absorption, adsorption, Diffusion.

UNIT – V

9 Periods

Control of air pollutants (Particulate): Air pollution control equipment's (units) such as wet scrubbers/collectors, centrifugal scrubbers, spray towers, packed beds.

TEXT BOOKS

1. Rao, M.N. and Rao, H.V.N. "Air Pollution", Tata McGraw Hill Company.
2. Elements of Air Pollution Control by Prof. T. Shivaji Rao
3. Murali Krishna, K.V.S.G. "Air pollution", Kaushal Publications – Kakinada.

REFERENCES

1. Air Pollution Control Technology by T. Painter.
2. Wark and Warner, "Air pollution", Harper & Row, New York.
3. Air Pollution Control by K.V.S.G. Murali Krishna.
4. Fundamentals of Air Pollution by Dr. B.S.N. Raju, Oxford & I.B.H.

5. Relevant NPTEL Courses.

ENGINEERING ECONOMICS AND FINANCE

CIV 415 F

Instruction : 2 Lectures & 1 Tutorial / week

End Exam : 3 Hours

Credits : 3

Sessional Marks : 40

End Exam Marks : 60

Course Objective:

To explain the basic principles of managerial economics, accounting practices and financial management techniques for effective business decision making and to promote entrepreneurial abilities among the budding engineers.

SYLLABUS

UNIT – I

9 Periods

Engineering economics: Basic principles – Time value of money, Quantifying alternatives for decision making, Cash flow diagrams, Equivalence- Single payment in the future (P/F, F/P), Present payment compared to uniform series payments (P/A,A/P), Future payment compared to uniform series payments (F/A,A/F),Arithmetic gradient, Geometric gradient.

UNIT – II

9 Periods

Comparison of alternatives – I: Present, future and annual worth method of comparing alternatives, Rate of return, Incremental rate of return.

UNIT – III

9 Periods

Comparison of alternatives – II: Break-even comparisons, Capitalized cost analysis, Benefit-cost analysis.

UNIT – IV

9 Periods

Depreciation, Inflation and Taxes: Depreciation, Inflation, Taxes.

Equipment economics: Equipment costs, Ownership and operating costs, Buy/Rent/Lease options, Replacement analysis.

UNIT – V

9 Periods

Cost estimating: Types of Estimates, Approximate estimates – Unit estimate, Factor estimate, Cost indexes, parametric estimate and Life cycle cost.

Financial management: Construction accounting, Chart of Accounts, Financial statements – Profit and loss, Balance sheets, Financial ratios, Working capital management.

Note: The student is expected to gain only elementary knowledge of the subject. Numerical Problems are for Internal Valuation only.

REFERENCES

1. Bulu Pradhan, “Construction Economics and Finance”, NPTEL Course, IIT Guwhati.
2. Peterson, S. J., 2011, “Construction Accounting and Financial Management”, Pearson Education, Upper Saddle River, New Jersey,
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