



SREE VIDYANIKETHAN ENGINEERING COLLEGE
(AUTONOMOUS)

Sree Sainath Nagar, Tirupati

Department of Civil Engineering

Supporting Document for 1.1.2

Syllabus Revision carried out in 2016

Program: B.Tech.- Civil Engineering

Regulations: SVEC-16

This document details the following:

1. Courses where syllabus has been changed 20% and more.
2. Course-wise revised syllabus with changes highlighted.

Note: For SVEC-16 revised syllabus, SVEC-14 (previous syllabus) is the reference.

**List of Courses where syllabus has been changed
(20% and more)**

Course Code	Name of the course	Percentage of Syllabus changed	Page Number in which Details are Highlighted
16BT20101	Building Materials and Construction Technology	100	4
16BT20131	Building Materials and Construction Technology Lab	100	7
16BT30104	Surveying	30	9
16BT30133	Surveying Lab	28	13
16BT40101	Concrete Technology	70	16
16BT40102	Engineering Geology	20	20
16BT40131	Concrete Technology Lab	35	21
16BT50102	Reinforced Cement Concrete Structures	33	24
16BT50104	Structural Analysis-II	20	30
16BT5HS02	Costing and Finance Management for Civil Engineers	100	34
16BT50131	Computer Aided Building Planning and Drawing	73	36
16BT50132	Environmental Engineering Lab	25	39
16BT60103	Steel Structures	20	41
16BT60104	Fire Engineering	100	45
16BT60105	Advanced Reinforced Cement Concrete Structures	25	47
16BT60107	Advanced Surveying	100	51
16BT60111	Structural Health Monitoring	100	53
16BT60112	Building maintenance and Repair	100	55
16BT60115	Environmental pollution and control	70	57
16BT60131	Computer Aided Design and Detailing Lab	30	61
16BT60132	Highway Engineering Lab	41	64
16BT70103	Railway, Airport and Harbour Engineering	75	68
16BT70107	Global Positioning System (GPS)	100	72
16BT70109	Transportation Planning and Management	30	74
16BT70111	Advanced Steel Structures	50	78
16BT70112	Earthquake Resistant Design of Structures	62	82
16BT70113	Highway Construction and Maintenance	45	86
16BT70114	Industrial Wastewater Treatment	75	90
16BT70118	Air Pollution and Control	100	94
16BT70120	Ground Improvement Techniques	20	96
16BT70121	Hydro Power Engineering	100	100

Course Code	Name of the course	Percentage of Syllabus changed	Page Number in which Details are Highlighted
16BT70122	Pavement Analysis and Design	100	102
16BT70123	Prestressed Concrete	45	104
16BT70131	Civil Engineering Software Lab	100	108
16BT1HS01	Technical English	20	110
16BT1HS31	English Language Lab	20	116
16BT1BS02	Engineering Physics	20	120
16BT2BS01	Transformation Techniques and Partial Differential Equations	100	126
16BT4HS31	Soft Skills Lab	100	129
16BT6HS05	French Language	100	131
16BT6HS06	German Language	100	133
16BT6HS07	Indian Constitution	100	135
16BT6HS08	Indian Economy	100	137
16BT6HS09	Indian Heritage and Culture	100	139
16BT6HS10	Indian History	100	142
16BT6HS11	Personality Development	100	144
16BT6HS13	Philosophy of Education	100	147
16BT6HS13	Public Administration	100	150
16BT20252	Matlab Practicefor Civil Engineers	100	153
16BT60241	Energy Audit and Conservation	100	155
16BT5HS02	Costing and Finance Management for Civil Engineers	100	158
16BT50441	Principles of Image Processing	100	160
16BT70413	Introduction to Nanoscience and Nanotechnology	100	162
16BT60310	Managing Innovation and Entrepreneurship	50	164
Average		71	
Total No. of Courses in the Program		112	
No. of Courses where syllabus (more than 20%) has been changed		54	
Percentage of Syllabus changed in the Program		34.2	


DEAN(Academics)
 Dean (Academics)
 Sree Vidyanikethan Engg. College
 Sree Sainath Nagar
 TIRUPATI - 517 102, A.P., India.


PRINCIPAL
 PRINCIPAL
 VIDYANIKETHAN ENGINEERING COLLEGE
 (AUTONOMOUS)
 Sree Sainath Nagar, A. RANGAMPET
 Chittoor (Dist.) - 517 102, A.P., INDIA.

I B. Tech. - II Semester

(16BT20101) BUILDING MATERIALS AND CONSTRUCTION TECHNOLOGY (Civil Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	0	3

PRE-REQUISITE: Engineering Chemistry

COURSE DESCRIPTION: Stones; Bricks; Tiles; Timber; Lime; Cement; Miscellaneous materials in construction; Masonry and Foundations; Building Components; Finishings; Shoring; Scaffolding and Formwork. **COURSE OUTCOMES:**

On successful completion of this course the students will be able to

CO1. Identify building materials, building components and construction techniques.

CO2. Characterize building materials and construction techniques.

CO3. Recommend proper building materials and construction techniques.

CO4. Develop new construction materials and construction techniques.

CO5. Use modern tools and techniques in construction practice.

CO6. Ensure health and safety in construction practice.

CO7. Encourage sustainable and environmental friendly building materials and construction techniques.

CO8. Maintain ethical standards for quality in construction.

CO9. Promote cost effective building materials and construction techniques.

CO10. Engage in continuous learning of latest construction materials and techniques.

DETAILED SYLLABUS:

UNIT I: STONES, BRICKS, TILES AND TIMBER

(09 periods)

Stones, Bricks and Tiles: Properties of building stones and structural requirements, Classification of stones, Stone quarrying, Blasting and dressing of stones, Composition of good brick earth, Manufacture of bricks, Qualities of a good brick, Efflorescence in bricks, Classification of bricks, Characteristics of good tile, Manufacturing methods - Types of tiles.

Timber: Structure, Properties, Seasoning of timber, Classification of various types of wood used in buildings, Defects in timber, Decay of timber, Mechanical treatment, Paints, Varnishes, Distempers, Bituminous wooden products in construction.

UNIT II: LIME, CEMENT AND CEMENT CONCRETE

(09 periods)

Lime: Ingredients of lime, Constituents of lime stone, Classification of lime, Manufacture of lime.

Cement and Cement Concrete: Ingredients of cement, Manufacture of OPC, Types of cement and their properties, Various field and laboratory tests on cement, Ingredients of cement concrete, Grades of concrete and their importance.

UNIT III: MISCELLANEOUS MATERIALS FOR CONSTRUCTION

(08 periods)

Use of Materials like galvanized iron, steel, aluminum, gypsum, copper, glass, bituminous materials, rubber, fiber-reinforced plastics, ceramic products, asbestos and their quality.

UNIT IV:

FOUNDATIONS, MASONRY AND BUILDING COMPONENTS

(10 periods)

Foundations and Masonry: Foundations, Shallow foundations, Spread, combined, strap and mat footings, Types of masonry, English and Flemish bonds, Rubble and Ashlar masonry, Cavity walls, Partition walls.

Building Components: Beams, Columns, Lintels, Arches, Vaults, Stair Cases, Types of floors: Concrete, Mosaic and Terrazzo Floors, Pitched, Flat and Curved roofs, Lean-to-Roof, Coupled roofs, Trussed roofs, King and Queen post trusses, RCC Roofs, Madras Terrace/Shell Roofs.

UNIT V: FINISHINGS, SHORING, SCAFFOLDING AND FORM WORK

(09 periods)

Finishings: Damp Proofing, water proofing, Termite proofing, Fire proof materials, Plastering, Pointing, Whitewashing and distempering, Painting, Constituents of a paint, Types of paints, Painting of new/old Wood, Varnish.

Shoring, Scaffolding and Form Work: Types, Erection methodology, Latest equipment, Safety precautions.

Total Periods: 45

TEXT BOOKS:

1. S.K.Duggal, *Building Materials*, New Age International Publishers, 4th Edition, 2010.
2. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Building Construction*, 10th Edition, Laxmi Publications (P) Ltd., 2010.

REFERENCE BOOKS:

1. R.K.Rajput, *Engineering Materials*, 3rd Edition, S. Chand and Company Ltd., New Delhi, 2006.
2. S. P. Arora and S. P. Bindra, *Building Construction*, Dhanpat Rai and Sons, 2010.
3. Varghese P. C., *Building Construction*, PHI Learning Pvt. Ltd., 2008.
4. K.K.Chitkara, *Construction Project Management: Planning Scheduling and Controlling*, 2nd Edition, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 2009.

I B. Tech. - II Semester
(16BT20131) BUILDING MATERIALS AND CONSTRUCTION TECHNOLOGY LAB

(Civil Engineering)

Int. Marks	Ext. Marks	Total Marks
50	50	100

L	T	P	C
-	-	3	2

PRE-REQUISITE: Building Materials and Construction Technology

COURSE DESCRIPTION: Exercises on Masonry; Bar bending; Painting; House wiring; Shuttering and scaffolding; Plumbing and sanitation; Building materials; Construction equipment.

COURSE OUTCOMES:

After completion of this course, a successful student will be able to:

- CO1.** Identify building materials, building components and construction techniques.
- CO2.** Characterize building materials and construction techniques.
- CO3.** Recommend proper building materials and construction techniques.
- CO4.** Develop new construction materials and construction techniques.
- CO5.** Use modern tools and techniques in construction practice.
- CO6.** Ensure health and safety in construction practice.
- CO7.** Encourage sustainable and environmental friendly building materials and construction techniques.
- CO8.** Maintain ethical standards for quality in construction.
- CO9.** Function effectively as an individual, and as a member or leader in teams.
- CO10.** Comprehend and write effective reports on building materials and construction techniques.
- CO11.** Promote cost effective building materials and construction techniques.
- CO12.** Engage in continuous learning of latest construction materials and techniques.

DETAILED SYLLABUS:

LIST OF EXERCISES:

A) MASONRY

1. Internal masonry
2. External masonry
3. Brickwork – English bond
4. Brickwork – Flemish bond

B) REINFORCEMENT

5. Demonstration of reinforcement skeleton for foundations, columns, beams, slabs, lintels, arches, vaults and stair cases.

C) BARBENDING

6. Columns and beams

7. Slabs

D) PAINTING

8. External wall painting

9. Internal wall painting

E) HOUSEWIRING

10. 15 amp line

11. 5 amp line

F) SHUTTERING AND SCAFFOLDING

12. Shuttering for beams and slabs

13. Shuttering for columns and walls

14. Steel scaffolding

15. Single and double scaffolding

G) PLUMBING AND SANITATION

16. Single and double stack system including fittings and fixtures

17. Plumbing of water supply line with GI and PVC material including fittings and fixtures

H) BUILDING MATERIALS

18. Properties and identification of building materials

19. Market survey for building materials

I) CONSTRUCTION EQUIPMENT

20. Specifications and identification of construction equipment

21. Market survey for construction equipment

II B.Tech. – I Semester (16BT30104) SURVEYING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Matrices and Numerical Methods, Engineering Physics.

COURSE DESCRIPTION: Chain surveying; Compass surveying; Plane tabling; Levelling and contouring; Theodolite surveying; Tachometric surveying; Computation of areas and volumes; Curves; Electronic distance measurement.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on chain, compass, plane table, auto level, theodolite, tachometer and EDM surveying; areas and volumes; curves.

CO2. Analyze surveying techniques, tools and survey data.

CO3. Design different types of curves and prepare contour maps.

CO4. Solve complex engineering survey problems through proper survey and interpretation.

CO5. Use appropriate modern tools in surveying. CO6. Follow ethics in surveying practice.

DETAILED SYLLABUS:

UNIT - I: CHAIN AND COMPASS SURVEYING (09 Periods)

Chain Surveying: Classification of surveying, Objectives, Principles of surveying, Distance measurement, Accuracy and errors, Chain and its types, Optical square, Cross staff, Reconnaissance and site location, Locating ground features by offsets, Field book, Chaining for outline of structures, Methods for overcoming obstacles, Conventional symbols, Plotting chain survey, Computation of areas, Errors in chain surveying and their elimination.

Compass Surveying: Types of compass, Bearings, Included angles, Errors and adjustments.

UNIT - II: PLANE TABLE SURVEYING, LEVELING AND CONTOURING (09 Periods)

Plane Table Surveying: Equipment, Methods of plane tabling, Errors, Two and three point problems.

Leveling and Contouring: Types of leveling, Types of leveling instruments, Temporary and permanent adjustments, Height of instrument and rise and fall methods, Plotting longitudinal sections and cross sections, Effect of curvature and refraction, Characteristics of contours, Uses of contour maps.

UNIT - III: THEODOLITE AND TACHEOMETRIC SURVEYING

(08 Periods) Theodolite Surveying: Description of theodolite, Temporary and permanent adjustments of vernier transit, Measurement of horizontal and vertical angles, Heights and distances, Traversing, Closing error and distribution, Gale's traverse table, Omitted measurements.

Tacheometric Surveying: Principle of stadia method, Distance and elevation formulae for staff held vertical and normal, Instrumental constants, Anallactic lens, Tangential method.

UNIT - IV: COMPUTATION OF AREAS AND VOLUMES, CURVES

(10 Periods) **Computation of Areas:** Areas dividing into number of triangles, By offsets to a base line, By coordinates, Areas from maps.

Computation of Volumes: Volume from cross-section, Embankments and cutting for a level section and two level sections with and without transverse slopes, Determination of the capacity of reservoir.

Curves: Different types and their characteristics, Setting out, **Design of curves by Rankine's and offset methods** - Circular, Transition, Combined and vertical curve.

UNIT - V: ELECTRONIC DISTANCE MEASUREMENT (EDM)

(09 Periods) **EDM Principle,** Modern electronic surveying equipment-Digital levels, Digital theodolites, Total station; Total station-Working principle, Applications: Measurement of distance, Area, Height, Angles, Gradients, Traversing, Contouring, Stake out, Data analysis.

Total Periods: 45

TEXT BOOKS:

1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Surveying – Vol. I, II and III*, Laxmi Publications (P) Ltd., 17th Edition, 2016.
2. R. Subramanian, *Surveying and Leveling*, Oxford University Press, 2nd Edition, 2012.

REFERENCE BOOKS:

1. S. K. Duggal, *Surveying – Vol. I and II*, Tata McGraw-Hill Publishing Co. Ltd., 4th Edition, 2013.
2. Arthur R. Benton and Philip J. Taetz, *Elements of Plane Surveying*, McGraw-Hill, 3rd Edition, 2010.
3. Arora, K. R., *Surveying – Vol. I and II*, Standard Book House, 14th Edition, 2011.
4. T.P. Kanetkar and S.V. Kulakarni, *Surveying and Leveling*, Pune Vidyarthi Griha Prakashan, Pune, 24th Edition, 2013.

IIB.Tech II Semester 14BT40103: SURVEYING

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	-	3

COURSE DESCRIPTION: Linear Measurements and Chain Surveying– Computation of Areas and Volumes– Compass Surveying– Leveling and Contouring– Theodolite– Tacheometric Surveying & Curves– Electronic Distance Measurement – Total Station.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

1. Apply the principles of mathematics, sciences in the field for evaluating heights, areas and volumes in surveying engineering
2. Analyze and interpret the survey techniques in calculating areas and volumes
3. Perform a survey and prepare a plot using appropriate methods

DETAILED SYLLABUS:

UNIT I

(08 Periods) **LINEAR**

MEASUREMENTS AND CHAIN SURVEYING: Principle – Classification – Accuracy and errors – Linear measurements – Direct measurements – Instruments for chaining – Ranging out survey lines – Errors in chaining – Field book – Instruments for setting right angles.

COMPUTATION OF AREAS AND VOLUMES: Areas: Areas dividing into number of triangles – By offsets to a base line – By latitudes and departures (D.M.D. and D.P.D.) – By coordinates – Areas from maps – Determination of the capacity of reservoir.

UNIT II

(10 Periods)

COMPASS SURVEYING: Types of compass – Bearings – Included angles – Errors and Adjustments.

LEVELLING AND CONTOURING: Types of levels – Auto Level – Temporary and permanent adjustments – Height of instrument and rise and fall methods – Effect of curvature and refraction – Characteristics of contours – Uses of contour maps.

UNIT III

(09 Periods)

THEODOLITE: Description and uses of vernier micrometer – Micro-optic theodolites – Temporary and permanent adjustments of vernier transit – Measurement of horizontal and vertical angles – Heights and distances – Traversing – Closing error and distribution – Gale's traverse table – Omitted measurements.

UNIT IV

(10 Periods)

TACHEOMETRIC SURVEYING: Principle of stadia method – Distance and elevation formulae for staff held vertical and normal – Instrumental constants – Anallactic lens – Tangential method.

CURVES: Basic definitions – Different types and their characteristics – Geometry – Setting out – Filed problem of Circular curve, Transition curve, Combined curve and Vertical curve by using Tacheometry.

UNIT V

(08 Periods)

ELECTRONIC DISTANCE MEASUREMENT: Modern surveying electronic equipments: digital levels, digital theodolites, EDMs.

TOTAL STATION: Principles – Working and applications: Measurement of Distance, Area,

Height, Angles, Gradients, Traversing, Contouring, Stakeout–DataAnalysis.

TotalPeriods:45

TEXT BOOKS

1. B.C.Punmia,AshokKumarJainandArunKumarJain,*Surveying – Vol.I,IIandIII*,15thEdition,LaxmiPublications(P)Ltd.,2010.
2. R. Subramanian, *Surveying and Leveling*, 1stEdition,Oxford UniversityPress,2010.

REFERENCEBOOKS

1. S.K.Duggal,*Surveying–Vol.IandII*,3rdEdition,TataMcGraw– HillPublishingCo.Ltd.,2010.
2. ArthurR.Bentonand PhilipJ.Taety,*ElementsofPlaneSurveying*, 3rd Edition,McGrawHill,2010.
3. Arora,K.R.,*Surveying–Vol.I and II*, 14th and 11th Edition, StandardBookHouse,2011.
4. TPKanetkar,SV Kulakarni, *Surveying andleveling by*, 24th Edition,Vidyathigrishaprakasham,2013.

II B.Tech. – I Semester (16BT30133) SURVEYING LAB

Int.Marks	Ext.Marks	TotalMarks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on Matrices and Numerical Methods, Engineering Physics.

COURSE DESCRIPTION: Exercises on chain surveying; Compass surveying; Plane table surveying; Auto Levelling; Theodolite surveying; Total stations surveying; Area by planimeter.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on chain, compass, plane table, auto level, theodolite, and total stations surveying setting out works, area measurement by planimeter.

CO2. Analyze surveying techniques, tools and survey data.

CO3. Design simple curves; and develop survey plots and contour maps.

CO4. Solve complex engineering survey problems through proper survey and interpretation.

CO5. Use appropriate modern tools in surveying. CO6. Follow ethics in surveying practice.

CO7. Function effectively as an individual and as a team member in surveying.

CO8. Communicate effectively on surveying in written, oral and graphical forms.

LIST OF EXERCISES:

A. CHAIN SURVEY

1. Cross staff survey and plotting
2. Chain traversing and plotting

B. COMPASS SURVEY

3. Determination of area by radiation method and plotting
4. Compass traversing and plotting

C. PLANE TABLE SURVEY

5. Resection – Two point and three point problems

D. LEVELLING

6. Longitudinal and cross-sectioning of a road profile and plotting
7. Contour plan of given area

E. THEODOLITE SURVEY

8. Measurement of horizontal angles by method of repetition and reiteration.
9. Trigonometric leveling – Measurement of heights and distances
10. Setting out simple curves by Rankine's method of

tangential angles

11. Setting out works for buildings and pipelines.

F. TOTAL STATION SURVEY

12. Determination of area using total station
13. Determination of remote height using total station
14. Distance, gradient, and differential height between two inaccessible points using total station.
15. Stake-out using total station
16. Traversing using total station
17. Contouring using total station

G. AREA BY PLANIMETER

18. Determination of area of irregular figure by using planimeter

IIB.TechIISemester

14BT40121:SURVEYINGLAB

InternalMarks	ExternalMarks	Total	L	T	P	C
25	50	75	-	-	3	2

PREREQUISITES: Engineering Mathematics and Engineering Physics

COURSE DESCRIPTION: Exercises on chain survey; compass survey; plane table survey; leveling, heights, distances and areas.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

1. Implement the procedure for an accurate and thorough note taking in the field work to serve as a legal note
2. Identify the differences in elevation, draw and utilize contour plots and calculate volume for earth work using different instruments
3. Design simple curves
4. Function effectively as a team member in multi-disciplinary teams
5. Effectively communicate information in written, oral and graphical formats

LIST OF EXPERIMENTS: CYCLE-I

1. CHAIN SURVEY:

1. Cross staff survey and plotting
2. Chain traversing and plotting

2. COMPASS SURVEY:

3. Determination of area by radiation method and plotting
4. Compass traversing and plotting

3. PLANETABLE SURVEY

5. Resection-Two point and three point problems
4. **LEVELLING:**
6. Longitudinal and cross-sectioning of a road profile and plotting.
7. Contouring exercise

CYCLE-II

5. THEODOLITE SURVEY:

8. Measurement of horizontal angles by method of repetition and reiteration.
9. Trigonometric leveling-Measurement of heights and distances
10. Setting out a simple curve by Rankine's method

6. TOTAL STATION SURVEY:

11. Determination of area using total station
12. Determination of remote height using total station.
13. Distance between two inaccessible points.
14. Traversing using total station

II B. Tech. – II Semester (16BT40101) CONCRETE TECHNOLOGY

Int. Marks	Ext. Marks	Total Marks
30	70	100

L	T	P	C
3	1	-	3

PRE-REQUISITES: Course on Building Materials and Construction Technology.

COURSE DESCRIPTION: Cement and admixtures; Aggregates; Fresh and hardened concrete; Tests on concrete; Elasticity, Creep and Shrinkage; NDT; Mix design- ACI and IS methods; Special concretes.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Demonstrate the knowledge on properties of cement, admixtures, aggregates, fresh and hardened concrete; elasticity, creep and shrinkage of concrete; special concrete.
- CO2. Characterize the constituent materials of concrete in choice of mix proportion.
- CO3. Design the concrete mix using IS-10262 and ACI method.
- CO4. Conduct various tests on fresh and hardened concrete.
- CO5. Make use of modern tools in Non-Destructive testing of concrete.
- CO6. Encourage the use of sustainable and environmental friendly constituent materials in manufacture of concrete.
- CO7. Maintain ethical standards for quality in concrete.

DETAILED SYLLABUS:

UNIT-I: CEMENT, ADMIXTURES AND AGGREGATES (09 Periods)

Cements and Admixtures: Portland cement, Grades of cement, Admixtures- mineral admixtures, chemical admixtures, Effects of admixtures on concrete properties.

Aggregates: Classification of aggregate, Physical properties, Mechanical properties, Bond strength, Bulking of sand, Deleterious substance in aggregate, Soundness of aggregate, Alkali aggregate reaction, Thermal properties, Sieve analysis, Gradation, Maximum aggregate size.

UNIT-II: FRESH AND HARDENED CONCRETE (10 Periods)

Workability, Factors affecting, Measurement of workability, **Setting times of concrete**, Effect of time and temperature on workability, Segregation and bleeding, Mixing and vibration, Manufacture of concrete, Ready mix concrete, Quality of mixing water, Water/Cement ratio, **Abram's Law**, **Gel spacer ratio**, **Curing**, Nature of strength of concrete, Maturity concept, Strength in tension and compression, Factors affecting strength, **Tests on hardened concrete**, Relation between compressive and tensile strength.

UNIT -III: ELASTICITY, CREEP, SHRINKAGE AND NDT

(08 Periods) Modulus of elasticity, Dynamic modulus of elasticity, Poisson's ratio, Creep, Relation between creep and time, **Nature of creep**, Effects of creep, Shrinkage, Types of shrinkage, **Non-destructive testing methods** - Rebound hammer, Ultrasonic pulse velocity method, Pullout; Code provisions for NDT.

UNIT-IV: MIX DESIGN

(10 Periods)

Factors in the choice of mix proportions, **Durability of concrete**, Quality control of concrete, Statistical methods, Acceptance criteria,

Proportioning of concrete mixes by various methods – ACI method and IS 10262 method.

UNIT-V: SPECIAL CONCRETES

(08 Periods)

Lightweight aggregates; Applications, types and properties- Lightweight aggregate concrete, Cellular concrete, No-fines concrete, High density concrete, Fibre reinforced concrete, Polymer concrete, High performance concrete, Self consolidating concrete, SIFCON, Bacterial concrete (Self-healing concrete).

Total Periods: 45

TEXTBOOKS:

1. M.S. Shetty, *Concrete Technology*, S. Chand and Company Ltd., New Delhi, 2003.
2. A.M. Neville, *Properties of Concrete*, Pearson Publication, 5th Edition, 2012.

REFERENCE BOOKS:

1. A.R. Santhakumar, *Concrete Technology*, Oxford University Press, New Delhi, 2006.
2. M.L. Gambir, *Concrete Technology*, Tata McGraw-Hill Publishing Co. Ltd, New Delhi, 3rd Edition, 2007.
3. Gupta, B.L. and Amit Gupta, *Concrete Technology*, Jain Book Agency, 4th Edition, 2014.
4. ACI 211.1-91: Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete (Reapproved 2009).

CODE:

Pages 1 to 4 from IS: 10262-2009: Concrete Mix Proportioning – Guidelines, **are to be permitted into the examination hall.**

IIB.Tech I Semester

14BT30103: BUILDING MATERIALS AND CONCRETE TECHNOLOGY

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Engineering Chemistry

COURSE DESCRIPTION: Bricks and Tiles – Timber – Lime and Other Materials for Construction – Cement and Concrete – Hardened Concrete – and Tests on Hardened Concrete – Elasticity, Creep and Shrinkage, Mix Design.

COURSE OUTCOMES:

After completion of this course, a successful student will be able to:

1. Understand various types and properties of building materials and procedure for making mix design.
2. Analyze building materials
3. Design a concrete mix for the given construction materials
4. Assess the properties of concrete mixes for various construction activities and suggest proper building materials for construction purposes.

DETAILED SYLLABUS:

UNIT I

(07 Periods) STONES, BRICKS

AND TILES: Properties of Building Stones and Structural Requirements – Classification of Stones – Stone Quarrying – Blasting and Dressing of Stones – Composition of good brick earth – Various methods of manufacture of bricks – Qualities of a good brick – Efflorescence in bricks – Classification of bricks – Characteristics of good tile – Manufacturing methods – Types of tiles.

TIMBER: Structure – Properties – Seasoning of timber – Classification of various types of woods used in buildings – Defects in timber – Decay of timber – Mechanical treatment – Paints – Varnishes – Distempers – Bituminous wooden products in construction.

UNIT II

(07 Periods)

LIME AND MISCELLANEOUS MATERIALS FOR CONSTRUCTION: Various

ingredients of lime – Constituents of limestone – Classification of lime – Various methods of manufacture of lime – Use of Materials like galvanized iron, steel, aluminum, gypsum, copper, glass, bituminous materials, rubber, fiber – Reinforced plastics, ceramic products, asbestos and their quality.

UNIT III

(12 Periods)

CEMENT AND CEMENT CONCRETE: Ingredients of cement – Manufacture of OPC – Types of cement and their properties – Various field and laboratory tests on cement.

Various ingredients of cement concrete and their importance –
 Proportioning of concrete – Water – cement ratio – Workability of concrete
 – Factors influencing workability – Measurement of workability – Effect of
 time and temperature on workability – Segregation and bleeding – Mixing
 and vibration of concrete – Quality of mixing water.

UNIT IV (10 Periods)

HARDENED CONCRETE AND TESTS ON HARDENED CONCRETE: Nature of strength
 of concrete – Maturity concept – Strength in tension and compression –
 Factors affecting strength – Relation between compression and tensile strength – Curing –
 Numerical Problems – Compression test
 – Tension test – Factors affecting strength – Flexure test – Non-destructive
 testing methods.

UNIT V (09 Periods)

ELASTICITY, CREEP AND SHRINKAGE: Modulus of elasticity – Dynamic modulus of elasticity –
 Poisson's ratio – Creep of concrete – Factors influencing creep –
 Relation between creep and time – Effects of creep – Shrinkage – Types of shrinkage.

MIX DESIGN: Factors in the choice of mix proportions – BIS method of
 mix design. – Numerical Problems on Mix Design.

Total Periods: 45

TEXTBOOKS

1. S.K. Duggal, *Building Materials*, 4th Edition, New Age International Publishers, 2010.
2. M.S. Shetty, *Concrete Technology*, 7th Edition, S. Chand and Company Ltd., 2011.

REFERENCES

1. Rajput R.K., *Engineering Materials*, 3rd Edition, S. Chand and Company Ltd., 2006.
2. A.R. Santha Kumar, *Concrete Technology*, 7th Edition, Oxford University Press, New Delhi, 2011.
3. A.M. Neville, *Properties of Concrete*, 5th Edition, Pearson Education, 2012.
4. M.L. Gambhir, *Concrete Technology*, 5th Edition, Mc. Graw Hill Education (India) Private Limited, 2013.

II B.Tech. – II Semester (16BT40102) ENGINEERING GEOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: General geology and weathering; Mineralogy and petrology; Structural geology and geophysical studies; Groundwater; Earthquake and landslides; Dams; Reservoirs; Tunnels; Bridges.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate basic knowledge on weathering, minerals, rocks, geological structures, geophysical methods, groundwater, earthquakes and landslides and site selection for civil engineering structures.

CO2. Analyze minerals, rocks, geological structures and failure of structures due to geological considerations.

CO3. Conduct geological investigations and give recommendations for the site suitability for construction.

CO4. Use modern methods and apply suitable techniques in geological study for civil engineering applications.

CO5. Demonstrate causes and effects of natural hazards and suggest remedial measures for the societal safety.

CO6. Consider environmental sustainability in exploitation of groundwater and construction materials using suitable methods.

CO7. Communicate effectively on geological maps and reports to the engineering community.

DETAILED SYLLABUS:

UNIT – I: GENERAL GEOLOGY AND WEATHERING

(8 Periods)

General Geology: Relevance of geology in civil engineering, Failures of civil engineering constructions due to geological drawbacks, Case histories, Geological report for different phases of site investigations.

Weathering: Types of weathering, Effects of weathering of rocks, Engineering classification of weathered rock masses, Importance of weathering with reference to dams, reservoirs, tunnels and bridges.

UNIT – II: MINERALOGY AND PETROLOGY

(10 Periods)

Mineralogy: Methods of study of minerals, Advantages of study of minerals by physical properties, Physical properties of minerals - Feldspar, Quartz, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite.

Petrology: Origin, Geological classification, Structures, Textures of rocks; Megascopic study of rocks- Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sandstone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble, Slate; **Engineering properties of rocks.**

UNIT –III: STRUCTURAL GEOLOGY AND GEOPHYSICAL STUDIES

(10 Periods) **Structural Geology:** Outcrop, Strike and dip, Classification and effects- Folds, Faults, Unconformities, Joints; **Problems- Thickness, Strike and dip of beds; Structural geology maps.**

Geophysical Studies: Gravity methods, Magnetic methods, Electrical resistivity methods, Seismic refraction methods, Radiometric methods and geothermal methods, **Civil engineering applications.**

UNIT– IV: GROUNDWATER, EARTHQUAKES AND LANDSLIDES

(9 Periods) **Groundwater:** Hydrological cycle, Types of groundwater, Hydrological properties of rocks, Cone of depression, Geological control of groundwater movement.

Earthquakes: Intensity and magnitude scales, Seismic zones, **Causes and effects**, Precautions to be taken for building construction in seismic areas.

Landslides: **Classification**, Causes and effects, Measures to be taken to prevent their occurrence.

UNIT –V: DAMS, RESERVOIRS, TUNNELS AND BRIDGES

(8 Periods) Geological considerations in a dam and reservoir sites, Analysis of dam failures of the past, Factors contributing to the success of a reservoir, **Geological considerations** in tunneling and **in a bridge site**, Effect of tunneling on the ground.

Total Periods: 45

TEXTBOOKS:

1. N. Chennakesavulu, *Engineering Geology*, Mc-Millan India Ltd., 2nd Edition, 2014.
2. Parbin Singh, *A Text Book of Engineering and General Geology*, S. K. Kataria and Sons, 8th Edition, 2012.

REFERENCE BOOKS:

1. D. Venkata Reddy, *Engineering Geology*, Vikas Publications, 2014.
2. Subinoy Gangopadhyay, *Engineering Geology*, Oxford University Press, 3rd Edition, 2015.
3. Vasudev Kanithi, *Engineering Geology*, University Press, 2012.
4. S. K. Dhuggal, H. K. Pandey, N. Rawal, *Engineering Geology*, McGraw-Hill Education Pvt. Ltd., 2nd Edition, 2014.

IIB.Tech I Semester 14BT30101: ENGINEERING GEOLOGY

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	-	3

COURSE DESCRIPTION: Importance of Geology in the Civil Engineering – Weathering – Mineralogy, Petrology – Structural Geology, Geophysical Studies – Ground Water, Earthquakes and Landslides – Geological Considerations for Dams, Reservoirs and Tunnels.

COURSE OUTCOMES:

After the completion of this course, a successful student will be able to:

1. Apply the knowledge of geological features, the properties of rocks and their suitability as building stones for various civil engineering constructions.
2. Analyze the failure of structures using geological studies.
3. Conduct investigations and give recommendations for the effective use of rocks, minerals for construction.
4. Use modern methods and apply suitable techniques for carrying out geophysical studies.
5. Explain causes of earthquakes and give remedial measures to the society for the safety.

DETAILED SYLLABUS: UNIT I

GENERAL GEOLOGY: Importance of geology from civil engineering point of view – Brief study of case histories of failure of some civil engineering constructions due to geological drawbacks – Importance of physical geology, petrology and structural geology, Weathering: Agents of weathering, Effects of weathering of rocks – Importance of weathering with reference to dams, reservoirs and tunnels.

UNIT II

MINERALOGY AND PETROLOGY: Definition of mineral – Importance of study of minerals – Different methods of study of minerals – Advantages of study of minerals by physical properties – Identification of minerals – Physical properties of common rock-forming minerals: Feldspar, Quartz, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite – Study of other common economic minerals: Pyrite, Hematite, Magnetite, Galena, Pyrolusite, Graphite, Magnesite and Bauxite – Origin, Geological classification into Igneous, Sedimentary and Metamorphic rocks – Common structures, textures of Igneous, Sedimentary and Metamorphic rocks – Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sandstone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

UNIT III**(10Periods) STRUCTURAL**

GEOLOGY ANDGEOPHYSICAL STUDIES: Outcrop– Strike and dip –Classification and recognition of folds, faults, unconformities,andjoints–Importanceofgeophysicalstudies– Principles ofgeophysicalstudies–Gravitymethods–Magneticmethods–Electrical resistivity methods– Seismicrefractionmethods– Radiometricmethods andgeothermal method – Special importance ofelectrical resistivity methodsandseismicrefractionmethods.

UNIT IV**(8Periods)****GROUNDWATER, EARTHQUAKEANDLANDSLIDES**

Groundwater :Hydrological cycle, Water table, Common types of groundwater, Coneofdepression, Geological controls ofgroundwater movement –Hydrological properties ofrocks: porosity, permeability, storativity, specific yieldandspecific retention – Earthquakes: causes andeffects–shieldareasandseismiczones–Seismicwaves–Richter scale–Precautionstobetakenforbuildingconstructioninseismicareas –Landslides:theircausesandeffect– Measuresto betakentoprevent theiroccurrence.

UNIT V**(8Periods)****GEOLOGYOFDAMS,RESERVOIRS****ANDTUNNELS:**Typesofdams–

Geologicalconsiderationsintheselectionof adamsite–Analysisofdams failuresofthepast– Factorscontributing tothesuccessofareservoir– Purposesoftunneling–Effectsof tunnelingontheground– Geological considerations(i.e.,Lithological,structuraland groundwater)intunneling, overbreakandliningintunnels. **TOTALPERIODS**

45**TEXT BOOKS:**

1. N.Chennakesavulu,*EngineeringGeology*,2nd Edition,Mc–Millan IndiaLtd.,2014.
2. ParbinSingh, *ATextBookofEngineeringandGeneralGeology*, 8thEdition,S.K.KatariaandSons,2012.

REFERENCEBOOKS

1. D. Venkata Reddy, *Engineering Geology*, 1st Edition, Vikas Publications,2014.
2. K.V.G.K.Gokhale,*PrinciplesofEngineeringGeology*,1stEdition,B.S. Publications, 2013.
3. F.G.Bell,*FundamentalofEngineeringGeology*,2ndEdition,B.S. Publications,2007.
4. S.K.Garg,*PhysicalandEngineeringGeology*,4thEdition,Khanna Publishers,2013.

II B.Tech. – II Semester

(16BT40131) CONCRETE TECHNOLOGY LAB

Int. Marks	Ext.Marks	TotalMarks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Concrete Technology.

COURSE DESCRIPTION: Testing of cement and sand; Testing of fresh and hardened concrete mixes; Non-destructive tests on concrete.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Demonstrate knowledge on test for cement, sand and concrete.
- CO2. Characterize the constituent material of concrete in the choice of mix proportion.
- CO3. Design the concrete mix using IS-10262.
- CO4. Conduct various tests on cement, sand and concrete in fresh and hardened state.
- CO5. Make use of modern tools in non-destructive testing of concrete.
- CO6. Maintain ethical standards for quality in concrete.
- CO7. Function effectively as an individual and as a team member in concrete technology using modern tools and techniques.
- CO8. Communicate effectively on concrete technology in written, oral and graphical forms.

LIST OF EXPERIMENTS:

1. Normal consistency test of cement
2. Test for initial and final setting time of cement
3. Soundness test of cement
4. Specific gravity test of cement
5. Compressive strength test of cement
6. Test for fineness of cement by dry sieving
7. Test for fineness of cement by Blaine's permeability apparatus
8. Bulking of sand test
9. Concrete mix design – IS 10262
10. Slump cone test
11. Compaction factor test
12. Vee-Bee consistometer test
13. Compressive strength test of concrete
14. Test for modulus of elasticity of concrete
15. Flexural strength test of concrete
16. Split tensile strength test of concrete
17. Rebound hammer test
18. PUNDIT
19. Concrete core test
20. Rapid chloride permeability test for durability of concrete

IIIB.Tech IISemester
14BT60121: CONCRETE AND HIGHWAY MATERIALS LAB

Internal Marks	External Marks	Total	L	T	P	C
25	50	75	-	-	3	2

PREREQUISITES: Transportation Engineering-I

COURSE DESCRIPTION: Testing of Aggregates, Cement and Bituminous material; Testing of Concrete and Bituminous mixes

COURSE OUTCOMES:

After completion of this course, a successful student will be able to:

1. Perform standard tests on Aggregates and Cements used in Buildings and Highway construction
2. Evaluate the quality and performance of Aggregates, Cement and Bituminous material and select suitable materials used in Buildings and Highway construction
3. Test and design Concrete and Bituminous mixes
4. Function effectively as a member or leader in teams to solve highway engineering problems
5. Communicate the properties of building and highway materials through a report after testing

LIST OF EXPERIMENTS: I. AGGREGATES

1. Aggregate crushing value
2. Aggregate impact test
3. Specific gravity and water absorption
4. Attrition test
5. Abrasion test
6. Shape tests
7. Bulking of Sand

II. BITUMINOUS MATERIALS

1. Penetration test
2. Ductility test
3. Softening point test
4. Flash and fire point tests
5. Bituminous Mix Design and testing using Marshall Stability Testing Machine

III. CEMENT AND CONCRETE

1. Normal consistency and fineness of cement
2. Initial setting time and final setting time of cement.
3. Specific gravity and soundness of cement

4. Compressive strength of cement
5. Workability test on concrete by Compaction factor, Slump and Vee-bee
6. Young's modulus and compressive strength of concrete
7. Concrete Mix Design and Testing

III B.Tech. – I Semester (16BT50102) **REINFORCED CEMENT CONCRETE STRUCTURES**

Int. Marks	Ext. Marks	Total Marks
30	70	100

L	T	P	C
3	1	-	3

PRE-REQUISITES: Courses on Building Materials and Construction Technology, Engineering Mechanics, Mechanics of Solids, Structural Analysis – I, Structural Analysis – II.

COURSE DESCRIPTION: Beams (Working stress and limit state methods); Shear, torsion and bond; Slabs; Columns; Shallow footings and Staircase.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Demonstrate the knowledge concepts, techniques and applications of design of reinforced cement concrete structural elements: beams, slabs, columns, footings, stair cases.
- CO2. Analyze different reinforced cement concrete structural elements.
- CO3. Design different reinforced cement concrete structural elements.
- CO4. Recommend suitable structural elements for reinforced cement concrete structures.
- CO5. Use appropriate method to design RCC structural elements.
- CO6. Ensure the RCC design as per safety and serviceability requirements.
- CO7. Uphold Ethics in RCC design.

DETAILED SYLLABUS:

UNIT -I: BEAMS

(09 Periods)

Beams (Working Stress Method): Behaviour of RCC beam in bending, Concept of working stress method, Design of beams- Rectangular, T, L.
Beams (Limit State Method): Concept of limit state method, Design of beams for flexure, shear, torsion- Rectangular, T and L beams.

UNIT-II: SHEAR, TORSION AND BOND

(08 Periods)

Limit state analysis and design of section for shear and torsion; Concept of bond, anchorage and development length; I.S. code provisions, Design of simply supported and continuous beams, Detailing; Limit state design for serviceability for deflection, cracking and code provision.

UNIT-III: SLABS (LIMIT STATE METHOD)

(08 Periods)

Limit state design of one way, two way and continuous slabs.

UNIT-IV: COLUMNS (LIMIT STATE METHOD) (08 Periods)

Design of axially and eccentrically loaded short and long column.

UNIT-V: SHALLOW FOOTINGS AND STAIRCASES (LIMIT STATE METHOD) (12 Periods)

Shallow Footings: Design of isolated square and rectangular footings for axially and eccentrically loaded columns, Design of combined footing.

Staircases: Types of staircases, Stairs spanning longitudinally and transversally.

Total Periods: 45

TEXT BOOKS:

1. S. Unnikrishna Pillai and Devdas Menon, *Reinforced Concrete Design*, Tata Mc. Graw Hill, 3rd Edition, 2010.
2. S.K. Roy and N.C. Sinha, *Fundamentals of Reinforced Concrete*, S. Chand & Company Ltd., 5th Edition, 2010.

REFERENCE BOOKS:

1. P. C. Varghese, *Limit State Design of Reinforced Concrete*, Prentice Hall of India, 2nd Edition, 2010.
2. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Reinforced Concrete structures – Vol. I*, Laxmi Publications Pvt. Ltd., 19th Edition, 2010.
3. N. Krishna Raju and R.N. Pranesh, *Reinforced Concrete Design*, CBS Publishers Distributors, 3rd Edition, 2010.
4. M. L. Gambhir, *Fundamentals of Reinforced Concrete Design*, Prentice Hall of India Pvt. Ltd., 2010.

CODE:

IS: 456–2000: Plain and Reinforced Concrete, **is to be permitted into the examination hall.**

IIIB.Tech I Semester
14BT50102: REINFORCED CEMENT CONCRETE
STRUCTURES-I

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Building Materials and Concrete Technology, Structural Analysis

COURSE DESCRIPTION: Introduction to IS 456 recommendations, Working Stress Method, Limit State Method–Design of Beams–Design of Columns–Design of Footings–Design of Slabs.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

1. Demonstrate the knowledge concepts, techniques of design of reinforced cement concrete structural elements
2. Analyze reinforced cement concrete structural elements
3. Design beams, columns and footings using IS Code.

DETAILED SYLLABUS:

UNIT I

(08 Periods)

INTRODUCTION TO IS CODE PROVISIONS: IS 456 recommendations–

Reinforced cement concrete, Concrete (constituents, grades, setting time and its behavior under tension and compression), Steel (types, grades and its behavior under tension and compression), Characteristic loads–Characteristic strength–Partial safety factors, Bonding between concrete and steel, Design methods of various RCC elements of a structure (Working stress method and Limit state method). Design of beam using working stress method.

UNIT II

(09 Periods) BEAMS:

Limit state design of singly reinforced and doubly reinforced beam in detail.

UNIT III

(08 Periods)

COLUMNS: Short and long columns under axial loads–Slender columns.

UNIT IV

(10 Periods) FOOTINGS:

Different types of footings–Design of isolated square, rectangular and circular footings–Design of combined footing.

UNIT V

(10 Periods)

SLABS: Design of one way slab–Two-way slab–Continuous slab using IS Coefficients.

Total Periods:45

TEXTBOOKS

1. S.Unnikrishna Pillai and Devdas Menon, *Reinforced Concrete Design*, 3rd Edition, Tata Mc.Graw Hill, 2010.
2. S.K.Ray and N.C.Sinha, *Fundamentals of Reinforced Concrete*, 5th Edition, S.Chand & Company Ltd., 2010.

REFERENCE BOOKS

1. P.C.Varghese, *Limit State Design of Reinforced Concrete*, 2nd Edition, Prentice Hall of India, 2010.
2. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Reinforced Concrete Structures- Vol.I*, 19th Edition, Laxmi Publications Pvt. Ltd., 2010.
3. N.Krishna Raju and R.N.Pranesh, *Reinforced Concrete Design*, 3rd Edition, CBS Publishers Distributors, 2010.
4. M.L.Gambhir, *Fundamentals of Reinforced Concrete Design*, 1st Edition, Prentice Hall of India Pvt.Ltd., 2010.

Codes: IS 456-2000 code book is to be permitted into the examination hall.

IIIB.TechIISemester

14BT60101: REINFORCED CEMENT CONCRETE STRUCTURES-II

Internal Marks	External Marks	Total Marks	L T P C
30	70	100	3 1 - 3

PREREQUISITES: RCCSI

COURSE DESCRIPTION: Structures–Foundations: strap, raft and piles– Retaining walls– Domes and water tanks– Silos and Chimneys.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

1. Explain the types of staircases, foundations and water tanks
2. Design staircase, foundation, retaining walls, water tanks, silos and chimney using IS code.
3. Suggest suitable type of foundation based on loading and soil conditions.

DETAILED SYLLABUS:

UNIT I (08 Periods)

STAIRCASES: Types of staircases–Stair spanning longitudinally and transversally

UNIT II (10 Periods)

FOUNDATIONS: Strap footing –Raft foundations–Design of piles and pile caps

UNIT III (09 Periods) RETAINING

WALLS: Lateral earth pressure–Design of cantilever and counterfort retaining walls.

UNIT IV (10 Periods) DOMES

AND WATER TANKS: Stresses in domes–membrane theory– design of dome– types of water tanks–IS code provisions–Design of water tanks with flexible base and rigid base.

UNIT V (08 Periods)

MISCELLANEOUS STRUCTURES: Design of silos–design of chimneys

Total Periods: 45

TEXTBOOKS

1. S. Unnikrishna Pillai and Devdas Menon, *Reinforced Concrete Design*, 3rd Edition, Tata Mc. Graw Hill, 2010.
2. P. C. Varghese, *Limit State Design of Reinforced Concrete*, 2nd Edition Prentice Hall of India, 2010.

REFERENCE BOOKS

1. N. C. Sinha and S. K. Roy, *Fundamentals of Reinforced Concrete*, 5th Edition, S. Chand & Company Ltd, 2010.
2. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Limit*

statedesignofReinforcedConcrete, Laxmi Publications Pvt. Ltd., 2007.

3.

N. Krishna Raju and R. N. Pranesh, *Reinforced Concrete Design*, 3rd Edition, CBS Publishers Distributors, 2010.

4. M. L. Gambhir, *Fundamentals of Reinforced Concrete Design*, Prentice Hall of India Pvt. Ltd., 2010.

III B.Tech. – I Semester (16BT50104) STRUCTURAL ANALYSIS – II

Int.Marks	Ext.Marks	TotalMarks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Structural Analysis – I.

COURSE DESCRIPTION: Shear force and bending moment for moving loads; Influence lines; Slope-deflection method; Moment distribution method; Kani's method; Energy method; Redundant pin-jointed frames; Plastic analysis.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on moving loads, influence lines, slope deflection method, moment distribution method, Kani's method, energy method and plastic analysis.

CO2. Analyze beams and frames using slope-deflection method, moment distribution method and Kani's method; beams subjected to moving loads, trusses.

CO3. Address complex problems associated with the analysis of beams for collapse loads using plastic theory.

CO4. Use appropriate method to analyze civil engineering structures.

CO5. Follow the analyzing principles to ensure safety of the structures.

CO6. Present the results of analysis such as bending moment and shear force distributions and deflection effectively in written and graphical forms.

DETAILED SYLLABUS:

UNIT - I: MOVING LOADS AND INFLUENCE LINES

(10 Periods) Moving Loads: Maximum shear force and bending moment at a given section and absolute maximum SF and BM due to single concentrated load, UDL longer than the span, UDL shorter than the span, two point loads and several point loads; Equivalent uniformly distributed load, Focal length.

Influence Lines: Influence line for support reaction, SF and BM; Load position for maximum SF and for maximum BM at a section; Loading-Point loads, UDL longer than the span, UDL shorter than the span; Influence lines for forces in members of Pratt and Warren trusses.

UNIT-II: INDETERMINATE BEAMS

(10 Periods)

Slope-Deflection Method: Basic concepts, Slope deflection equation, Application to continuous beams with and without settlement of supports.

Moment Distribution Method: Basic concepts, Stiffness factor, Carryover factor, Application to continuous beams with and without settlement of supports.

UNIT - III: KANI'S METHOD AND ENERGY METHOD

(09 Periods) Kani's Method: Analysis of continuous beams including settlement of supports, Single bay-single storey portal frames with and without sidesway.

Energy Method: Strain in linear elastic system, Expression of strain energy due

to axial load, BM and SF, Castigliano's first theorem, Deflections of simple beams and pin-jointed plane trusses.

UNIT - IV: REDUNDANT PIN-JOINTED FRAMES

(08 Periods) Indeterminate frames, Static and kinematic indeterminacies, Castigliano's theorem, Analysis of pin-jointed frames up to two degrees of internal and external indeterminacies.

UNIT-V: PLASTIC ANALYSIS

(08 Periods)

Introduction to plastic analysis, Shape factor, Plastic hinge; Collapse loads for simply supported beams, Upper bound and lower bound theorems, propped cantilevers and two span continuous beams.

Total Periods: 45

TEXT BOOKS:

1. R. Vaidyanathan and P. Perumal, *Structural Analysis*-Vol. I and II, Laxmi Publications, 4th Edition, 2016.
2. V.N. Vazirani, M.M. Ratwani and S.K. Duggal, *Analysis of Structures*-Vol. II, Khanna Publications, 16th Edition, 2013.

REFERENCE BOOKS:

1. Ramamrutham, S. and Narayanan, R., *Theory of Structures*, Dhanpat Rai Publishing Co. Ltd., 9th Edition, 2014.
2. S. S. Bhavikatti, *Structural Analysis* - Vol. I and II, Vikas Publishing House Pvt Ltd., 4th Edition, 2010
3. Punmia, B.C., Ashok Kumar Jain and Arun Kumar Jain, *SMTS- II- Theory of Structures*, Laxmi Publications (P) Ltd., 13th Edition, 2017.

R. S. Khurmi, *Theory of Structures*, S. Chand & Company Ltd., 22nd Edition, 2010.

IIIB.TechISemester
14BT50101:STRUCTURALANALYSIS-II

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Structuralanalysis-I

COURSE DESCRIPTION: Shear Force and Bending Moment, Concentrated Load and Moving Load, Influence Lines–Moment Distribution Method–Slope–Deflection Method –Kani’s Method – Energy Method –Redundant Pin–Jointed Frames – MultiStorey Frames.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

1. Understand the concepts of Moving loads, influence lines, slope deflection, moment distribution method, Kani’s method, energy methods
2. Analyse the beams and frames using different methods.

DETAILED SYLLABUS:

UNIT I (10 Periods)

MOVING LOADS: Maximum SF and BM at a given section and absolute maximum SF and BM due to single concentrated load, UDL longer than the span, UDL shorter than the span, two point loads and several point loads– Equivalent uniformly distributed load–Focal length.

INFLUENCE LINES: Influence line for support reaction, shear force and bending moment– Load position for maximum SF and for maximum BM at a section– Point loads, UDL longer than the span, UDL shorter than the span– Influence lines for forces in members of Pratt and Warren trusses.

UNIT II (10 Periods) SLOPE–

DEFLECTION METHOD: Basic concepts –Slope deflection equation– Application to continuous beams with and without settlement of supports.

MOMENT DISTRIBUTION METHOD: Basic concepts–Stiffness factor– Carry over factor– Application to continuous beams with and without settlement of supports.

UNIT III (10 Periods)

KANI’S METHOD: Analysis of continuous beams including settlement of supports– Single bay, single storey portal frames without sidesway.

ENERGY METHOD: Strain in linear elastic system– Expression of strain energy due to axial load, bending moment and shear forces– Castigliano’s first theorem– Deflection of simple beams and pin jointed plane trusses.

UNIT IV (08 Periods)

MULTISTOREY FRAMES (Approximate Methods): Substitute frame method (Two cycle method) for gravity loads – Portal method and cantilever method for lateral loads.

UNIT V

(07 Periods)

REDUNDANT PIN-JOINTED FRAMES: Introduction to indeterminate frames – Static and kinematic indeterminacies – Castigliano's theorem – Analysis of pin-jointed frames with up to two degrees of internal and external indeterminacies.

Total Periods: 45

TEXTBOOKS

1. Ramamrutham, S. and Narayanan, R., *Theory of Structures*, 9th Edition, Dhanpat Rai Publishing Co. Ltd., 2014.
2. V.N. Vazirani, M.M. Ratwani and S.K. Duggal, *Analysis of Structures – Vol. II*, 16th Edition, Khanna Publications, 2013.

REFERENCE BOOKS

1. H.J. Shah and S.B. Junnarkar, *Mechanics of Structures – Vol. II*, 21st Edition, Charotar Publishing House, 2010.
2. Pandit, G., Gupta, S. and Gupta, R., *Theory of Structures – Vol. II*, 1st Edition, Mc. Graw Hill Publishing Co. Ltd., 1999.
3. Punmia, B.C., Ashok Kumar Jain and Arun Kumar Jain, *SMTS – II – Theory of Structures*, 12th Edition, Laxmi Publications (P) Ltd., 2004.
4. R.S. Khurmi, *Theory of Structures*, 22nd Edition, S. Chand & Company Ltd., 2010.

III B.Tech. – I Semester (16BT5HS02) COSTING AND FINANCE MANAGEMENT FOR CIVIL ENGINEERS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: -

COURSE DESCRIPTION: Cost Planning; Contract Costing; Budgeting; Capital Budgeting; Estimation of Cash Flows; Working Capital Management.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Acquire knowledge in
- The basic concepts of finance
 - Basic principles of costing
- c) Provides skills for effective utilization of costing concepts for quoting tenders
- d) Framing budgets in relation to construction CO2.
- Develop skills in analyzing problems for
- Quoting tenders in relation to civil engineering
 - Budgeting finance for construction industry
- c) Enhancing ability in calculating working capital requirement
- d) Improvising ability in estimating cash flows CO3.
- Design solutions for effective decisions in investment
- CO4. Develop effective communication in relation to costing and finance.
- CO5. Manage Finances for Civil Engineering Projects.

DETAILED SYLLABUS:

UNIT-I: COST PLANNING (09 Periods)

Cost predication and estimating in civil engineering projects – Approximate estimating – Preliminary estimating – Detailed estimating – Cost plan inclusions

UNIT-II: CONTRACT COSTING (10 Periods)

Meaning – Definition – Simple Contract Accounts – Comparative Contract Accounts – Contract Accounts with Balance Sheet – Estimation of Contracts (Simple problems)

UNIT-III: BUDGETING (08 Periods)

Concept of Budget – Classification of Budgets – Considerations in preparing Budgets – Concept of Budgetary Control – Objectives and benefits of Budgetary Control – Essentials of a good Budgetary Control

UNIT-IV: CAPITAL BUDGETING (10 Periods)

Introduction – Nature of Capital Budgeting – Types of Capital Budgeting Decisions – Investment Evaluation Criteria – NPV – IRR – PI (simple problems)

Estimation of Cash Flows: Introduction – Cash Flows – Incremental Cash Flows – Capital and Depreciation for tax purpose

UNIT-V: WORKING CAPITAL MANAGEMENT (08 Periods)

Introduction – Concepts of Working Capital – Operating Cycle and Cash Conversion cycle – Determination of Working Capital

-SourcesofWorkingCapitalFinance–TradeCredit–Accrued expensesandddifferedincome–BankFinanceforWorkingCapital

TotalPeriods:45

TEXT BOOKS:

1. S.P.JainandK.L.Narang,*CostAccounting*,KalyaniPublishers, Ludhiana,12thEdition,2008.
2. I.M.Pandey,*FinancialManagement*,VikasPublishingHousePvt. Ltd.,11thEdition,2015.

REFERENCEBOOKS:

1. TheInstituteofCompanySecretariesofIndia, Costand Management StudyMaterial, New Delhi.
2. JamesCVanHorneandJohnMWachowicz,*Fundamentalsof Financial Management*, Prentice-Hall of India/Pearson,13th Edition,2009.

III B.Tech. – I Semester

(16BT50131) COMPUTER AIDED BUILDING PLANNING AND DRAWING

Int.Marks	Ext.Marks	TotalMarks	L	T	P	C
50	50	100	-	1	3	2

PRE-REQUISITES: Course on Building Materials and Construction Technology.

COURSE DESCRIPTION: Exercises on Conventional signs and symbols used in building; Planning and computer aided drawing of load bearing walls; RCC framed structures; Industrial buildings.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Explain knowledge on computer aided building drawing to develop the 2D and 3D views of structures using AutoCAD.
- CO2. Analyze the given data for the developing the plans, elevations, cross-sectional view of the structures.
- CO3. Design and develop the buildings plans, elevations, sectional views using AutoCAD.
- CO4. Use appropriate drafting tools for developing the plans, elevation, sectional views using AutoCAD.
- CO5. Utilize contextual knowledge for preparing the structural elements and building plans as per the engineering practice.
- CO6. Follow building bye-laws and principles for promoting building plans, elevation, sectional views using AutoCAD.
- CO7. Function effectively as an individual and as a team member to develop plan, elevation, cross sectional view of the structural elements and buildings using AutoCAD.
- CO8. Communicate effectively on the building planning and drawing using AutoCAD in written, oral and graphical forms.
- CO9. Promote cost effective building plans by management principles using AutoCAD.

DETAILED SYLLABUS:

SOFTWARE: AutoCAD

LIST OF EXERCISES:

1. Conventional signs in building drawing
2. Elevation and sectional view of windows and ventilators
3. Elevation and sectional view of doors
4. Isolated footings details.
5. Plan, elevation and sectional views of building (Load bearing wall structure)

6. Elevation and sectional view of RCC framed structures
7. North light roof truss details
8. King post truss details
9. Queen post truss details
10. Perspective view of one storey buildings
11. Perspective view of two storey buildings

TEXT BOOKS:

1. Varma B. P., *Civil Engineering Drawing and House Planning*, Khanna Publishers, 10th Edition, 2008.
2. Balagopal and T. S. Prabhu, *Building Drawing and Detailing*, Spades Publishers, 1987.

REFERENCE BOOKS:

1. Shah, M. G., *Building Drawing*, Tata McGraw-Hill, 2007.
2. Kumaraswamy N. and Kameswara Rao A., *Building Planning and Drawing*, Charotar Publishing, 4th Edition, 2010.
3. Kale and Patki, Shah, *Building Drawing with Integrated Approach to Built Environment*, Tata McGraw-Hill, 2002.
4. K. V. Natarajan, *A Text Book of Engineering Graphics*, N. Dhanalakshmi Publishers, 2015.

IIIB.TechISemester

14BT50121:COMPUTERAIDEDBUILDING PLANNING&DRAWINGLAB

	Internal Marks	External Marks	Total	L	T	P	C
25	50	75	- - 3 2				

PREREQUISITES: Building materials and Concrete Technology

COURSE DESCRIPTION: Loading bearing walls; RCC framed structures; Industrial buildings; view on one and two storey buildings.

COURSE OUTCOMES:

After completion of this course, a successful student will be able to:

1. Explain knowledge on building planning and drawing; and AutoCAD drafting
2. Analyse the given data to draw plan, elevation and cross-sectional view of a structure
3. Draft the civil engineering drawing using AutoCAD
4. Prepare drawings and provide report on the building plan, section and elevation.

SOFTWARE: AUTOCAD LIST OF EXPERIMENTS:

1. Buildings with load bearing walls (Flat and pitched roof)
- Including details of doors and windows
2. RCC framed structures
3. Industrial buildings - North light roof trusses
4. Perspective view of one and two storey buildings

TEXTBOOKS

1. Varma B.P., *Civil Engineering Drawing and House Planning*, 10th Edition, Khanna Publishers, 2008.
2. Balagopal and T.S. Prabhu, *Building Drawing and Detailing*, Spades Publishers, 1987.

REFERENCE BOOKS

1. Shah, M.G., *Building Drawing*, Mc.Graw Hill, New Delhi, 2007.
2. Kumaraswamy N. and Kameswara Rao A., *Building Planning and Drawing*, 4th Edition, Charotar Publishing, 2010.
3. Kale and Patki, Shah, *Building Drawing with Integrated Approach To Built Environment*, Mc.Graw Hill, New Delhi, 2002.
4. K.V. Natarajan, *A Text Book of Engineering Graphics*, N. Dhanalakshmi Publishers, 2015.

III B.Tech. – I Semester

(16BT50132) ENVIRONMENTAL ENGINEERING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on Water Supply Engineering, Wastewater Technology.

COURSE DESCRIPTION: Experimental analysis of physical, chemical and biological parameters of water and wastewater.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Demonstrate the knowledge on experimental analysis of water and wastewater.
- CO2. Analyse water and wastewater.
- CO3. Solve complex problems associated with water and wastewater through proper investigations and interpretation of data.
- CO4. Use appropriate techniques in the analysis of water and wastewater.
- CO5. Provide solutions to the problems of water and wastewater ensuring health and safety.
- CO6. Consider environmental sustainability in solving water and wastewater problems.
- CO7. Follow standards in water and wastewater analysis.
- CO8. Function effectively as an individual, and as a member or leader in a team to solve the water and wastewater problems.
- CO9. Communicate effectively on water and wastewater analysis in written, oral and graphical forms.

LIST OF EXPERIMENTS:

1. Determination of pH, turbidity and electrical conductivity
2. Determination of colour
3. Determination of alkalinity and acidity
4. Determination of total suspended solids and total dissolved solids
5. Determination of total solids, volatile and fixed solids.
6. Determination of chlorides
7. Determination of iron and fluorides
8. Determination of optimum coagulant dose
9. Determination of residual chlorine
10. Determination of Dissolved Oxygen
11. Determination of B.O.D
12. Determination of C.O.D
13. Determination of nitrogen
14. Determination of total phosphorus
15. Determination of sulphates
16. Bacterial examination

14BT60122: ENVIRONMENTAL ENGINEERING LAB

Internal Marks	External Marks	Total	L	T	P	C
25	50	75	-	-	3	2

PREREQUISITES: Water Supply Engineering

COURSE DESCRIPTION: Physical and chemical analysis for water and wastewater

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

1. Demonstrate the knowledge on experimental analysis of water and wastewater
2. Test water quality and assess waste water characteristics using different treatment methods
3. Function effectively as a member or leader in a team to solve water and wastewater problems
4. Write a report after testing the water samples

LIST OF EXPERIMENTS:

1. Determination of pH and turbidity
2. Determination of conductivity and total dissolved solids.
3. Determination of alkalinity/acidity.
4. Determination of chlorides.
5. Determination and estimation of total solids, organic solids and inorganic solids.
6. Determination of optimum coagulant dose
7. Determination of chlorine demand
8. Determination of dissolved oxygen
9. Determination of B.O.D
10. Determination of C.O.D
11. Determination of iron
12. Determination of nitrogen.
13. Determination of total phosphorous
14. Determination of sulphates

III B.Tech. – II Semester (16BT60103) STEEL STRUCTURES

Int. Marks	Ext. Marks	Total Marks
30	70	100

L	T	P	C
3	1	-	3

PRE-REQUISITES: Courses on Engineering Mechanics, Mechanics of Solids, Structural Analysis-I, Structural Analysis- II.

COURSE DESCRIPTION: Bolted connections; Welded connections; Beams; Tension members; Compression members; Built-up Compression members; Column foundations, Roof trusses; Tubular trusses.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Attain the basic knowledge on design of steel structures and their elements by limit state method.
- CO2. Analyze the steel structures and their elements. CO3. Design steel structures and their elements.
- CO4. Provide solutions to complex engineering problems associated with steel construction through proper analysis and design.
- CO5. Use appropriate techniques to analyze and design of steel structures and their elements.
- CO6. Ensure safety and stability in the design of steel structures and their elements.
- CO7. Follow IS codes in the design of steel structures and their elements.

DETAILED SYLLABUS:

UNIT - I: BOLTED AND WELDED CONNECTIONS

(10 Periods) Bolted Connections: Strength and efficiency of a joint, Lap Joint, Butt joint, Eccentric connections.

Welded Connections: Strength of welds, Butt and fillet welds, Design of fillet welds subjected to axial load, Design of fillet welds subjected to moment acting in the plane and at right angles to the plane of the joints, Beam to beam and beam to column connections.

UNIT -II: BEAMS

(09 Periods)

Bending, Shear and bearing strength, Design of simple beams, Design of compound beams, Design of connection of cover plates with the flanges of beams.

UNIT-III: TENSION AND COMPRESSION MEMBERS

(09 Periods) Tension Members: Net effective sectional area for angle and tee sections, Design of tension members, Lug angles.

Compression Members: Effective length, Radius of gyration and slenderness of compression members, Design strength, Design of axially loaded compression members.

UNIT-IV: BUILT-UP COMPRESSION MEMBERS AND COLUMN FOUNDATIONS

(9 Periods)

Built-up Compression Members: Design of built-up compression members, Design of lacings and battens, Design principles of eccentrically loaded columns, Splicing of columns.

Column Foundations: Design of slab base and gusseted bases, Column bases subjected to moment.

UNIT-V:ROOFANDTUBULARTRUSSES (8Periods)

Roof Trusses: Different types of trusses, Design loads, Load combinations, IS Code recommendations, Structural details, Design of simple roof trusses involving the design of purlins, members and joints.

Tubular Trusses: Design of tension members, Compression members, Connections.

Total Periods: 45

TEXT BOOKS:

1. S. S. Bhavikatti, *Design of Steel Structures*, I. K. International Publishing House Pvt. Ltd., 3rd Edition, 2010.
2. S. K. Duggal, *Limit State Design of Steel Structures*, Mc.GrawHill, 2nd Edition, 2014.

REFERENCE BOOKS:

1. N. Subramanian, *Design of Steel Structures*, Oxford University Press, 2010.
2. N. Krishna Raju, *Structural Design and Drawing*, Universities Press, Hyderabad, 3rd Edition, 2009.
3. S. Ramachandra, *Design of Steel Structures*, Dhanpat Rai Publishing Company, 2nd Edition, 2007.
4. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Design of Steel Structures*, Laxmi Publications, 2nd Edition, 2013.

CODES/TABLES:

1. IS: 800-2007: General Construction in Steel – Code of Practice,
2. IS: 875- Part III: Code of Practice for Design Loads (Other than Earthquake) For Buildings and Structures,
3. IS: 1161-1998: Steel Tubes for Structural Purposes – Specifications,
4. Steel Tables, **are to be permitted into the examination hall.**

IVB.Tech I Semester

14BT70101: STEEL STRUCTURES

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: SA&RCCS

COURSE DESCRIPTION: Design concepts–connections: Bolts, rivets, welds–Tension and compression members –Beams and built-up compression members– Design of column foundations

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

1. Attain the knowledge on various structural steel elements.
2. Analyze the steel structures and their elements
3. Design elements of Steel Structures.

DETAILED SYLLABUS:

UNIT I

(06 Periods) DESIGN

CONCEPTS: Types of rolled steel sections –Stress–strain relationship for mild steel– Loads–Design concepts of steel structures– Working stress design– Limit state design– Design requirements–Design strength–Serviceability limit state.

UNIT II

(11 Periods)

RIVETED, BOLTED AND WELDED CONNECTIONS: Failure of a joint– Strength and efficiency of a joint–Lap joint–Butt joint–Eccentric connections. Strength of welds– Butt and fillet welds–Design of fillet weld subjected to axial load– Design of fillet weld subjected to moment acting in the plane and at right angle to the plane of the joints– Beam to beam and beam to column connections.

UNIT III

(10 Periods)

TENSION AND COMPRESSION MEMBERS: Net effective sectional area for angle and tee sections–Design of tension members –Lug angles. Effective length, radius of gyration and slenderness of compression members – Design strength–Design of axially loaded compression members.

UNIT IV

(11 Periods)

BEAMS AND BUILT-UP COMPRESSION MEMBERS: bending, shear and bearing strength–Design of simple beams–Design of plated beams– Design of connection of cover plates with the flanges of beams. Design

of built-up compression members–Design of flanges and battens–Design principles of eccentrically loaded columns–Splicing of columns.

UNIT V

COLUMN FOUNDATIONS: Design of slab base and Column bases subjected to moment

(07 Periods) DESIGN OF
gusseted bases–

Total Periods: 45

TEXTBOOKS

1. S.K. Duggal, *Limit State Design of Steel Structures*, 2nd Edition, Mc.Graw Hill, 2014.
2. N. Subramanian, *Design of Steel Structures*, 1st Edition, Oxford University Press, 2010

REFERENCE BOOKS

1. S.S. Bhavikatti, *Design of Steel Structures*, 2nd Edition, I. K. International Publishing House Pvt. Ltd., 2010.
2. N. Krishna Raju, *Structural Design and Drawing*, 3rd Edition, Universities Press, Hyderabad, 2009.
3. Ramachandra and Virendra Gehlot, *Design of Steel Structures*, 11th Edition, Scientific Publishers, 2005.
4. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Design of Steel Structures*, 2nd Edition, Laxmi Publications, 2013.

III B.Tech. – II Semester
(16BT60104) FIRE ENGINEERING
 (Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks
30	70	100

L	T	P	C
3	1	-	3

PRE-REQUISITES: Courses on Engineering Chemistry, Building Materials and Construction Technology, Environmental Studies.

COURSE DESCRIPTION: Physics and chemistry of fire; Fire prevention and protection; Industrial fire protection systems; Building fire safety; Explosion protecting systems.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Acquire the knowledge on fire characteristics, fire detection, fire protection and explosion protection.
- CO2. Analyze fire characteristics, fire detection systems, fire and explosion protection systems.
- CO3. Design building elements and develop fire and explosion protection systems.
- CO4. Solve fire engineering problems through proper investigation and interpretation.
- CO5. Use appropriate techniques to solve fire engineering problems.
- CO6. Ensure health and fire safety in solving fire engineering problems.
- CO7. Consider environmental sustainability in fire and explosion protection systems.
- CO8. Follow rules and regulations in fire engineering practice.
- CO9. Prepare layouts and diagrams in fire engineering.
- CO10. Manage effectively fire and explosion protection systems.

DETAILED SYLLABUS:

UNIT - I: PHYSICS AND CHEMISTRY OF FIRE

(09 Periods) Fire properties of solid, liquid and gases; Fire spread, Toxicity of products of combustion, Theory of combustion and explosion, Vapour clouds, Flash fire, Jet fires, Pool fires, Unconfined vapour cloud explosion, Shock waves, Auto-ignition, Boiling liquid expanding vapour explosion, Case studies.

UNIT-II: PRINCIPLES OF FIRE PREVENTION, DETECTION AND WARNING (09 Periods)

Sources of ignition, Fire triangle, Principles of fire extinguishing, Various classes of fires – A, B, C, D & E, Types of fire extinguishers, Fire stoppers, Alarm and detection systems, Fire station – Fire alarms and sirens, Maintenance of fire trucks, Foam generators, Escape from fire rescue operations, Fire drills, Notice, First aid for burns.

UNIT - III: INDUSTRIAL FIRE PROTECTION SYSTEMS

(09 Periods) Active and passive fire protection systems, Sprinkler-hydrants-stand pipes, Special fire suppression systems like deluge and emulsifier, Selection criteria of the above installations, Reliability,

Maintenance, Evaluation and standards, Hydrant pipes, Hoses, monitors, Fire watchers, Layout of stand pipes, Other suppression systems, CO₂ system, Foams system, Dry chemical powder (DCP) system, Halon system, Need for halon replacement, Smoke venting, Portable extinguishers, Flammable liquids, Tank farms, Indices of inflammability, Fire fighting systems.

UNIT-IV: BUILDING FIRE SAFETY (09 Periods)

Design of building elements for passive fire protection, Fire load, Fire resistant material and fire testing, Structural fire protection, Structural integrity, Classification of buildings based on occupancy, Concept of egress design, Exit requirements, Width calculations, fire certificates, Fire safety requirements for high rise buildings, Snookers.

UNIT - V: EXPLOSION PROTECTING SYSTEMS (09 Periods)

Principles of explosion, Detonation and blast waves, Explosion parameters, Explosion Protection, Containment, Flame Arrestors, Isolation, Suppression, Venting, Explosion relief of large enclosure, Explosion venting, Inert gases, Plant for generation of inert gas, Ruptured disc in process vessels and lines explosion, Suppression system based on carbon dioxide (CO₂) and halons - hazards in LPG, ammonia (NH₃), sulphur dioxide (SO₂), chlorine (Cl₂) etc.

Total Periods: 45

TEXTBOOKS:

1. V. K. Jain, *Fire Safety in Buildings*, New Age International Publishers, 2010.
2. Akhil Kumar Das, *Principles of Fire Safety Engineering*, Prentice Hall India Learning Pvt. Ltd., 2014.

REFERENCE BOOKS:

1. Gupta, R. S., *Hand Book of Fire Technology*, Orient Longman, Bombay 1977.
2. S. Rao, R. K. Jain and H. I. Saluja, *Electrical Safety, Fire Safety Engineering and Management*, Kanna Publications, New Delhi, 2012.
3. John A. Purkiss and Long-yuan Li, *Fire Safety Engineering Design of Structures*, CRC Press, 3rd Edition, 2013.
4. Butcher, E. G. and Parnell, A. C., *Designing of Fire Safety*, John Wiley and Sons Ltd., 1983.
5. Derek W. B. James, *Fire Prevention Hand Book*, Butter Worths and Company, 1986.

IIIB.Tech. – IISemester
(16BT60105) ADVANCED REINFORCED CEMENT
CONCRETE STRUCTURES

(Program Elective –1)

Int. Marks	Ext. Marks	Total Marks
30	70	100

L	T	P	C
3	1	-	3

PRE-REQUISITES: Courses on Building Materials and Construction Technology, Engineering Mechanics, Mechanics of Solids, Structural I, Structural Analysis – II, Reinforced Cement Concrete Structures.

Analysis–

COURSE DESCRIPTION: Foundations; Flatslabs; Watertanks; Retaining walls; Bunkers; Silos; Chimneys.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Demonstrate the knowledge concepts, techniques and applications of design of reinforced cement concrete structures; foundations, flatslabs, watertanks, retaining walls, bunkers, silos, chimneys.
- CO2. Analyze different reinforced cement concrete structures.
- CO3. Design different reinforced cement concrete structures.
- CO4. Recommend suitable structural elements for reinforced cement concrete structures
- CO5. Use appropriate method to design RCC structures.
- CO6. Ensure the RCC design as per safety and serviceability requirements.
- CO7. Uphold Ethics in RCC design

DETAILED SYLLABUS:

UNIT-I: FOUNDATIONS

(10 Periods)

Design of Strap footings, Raft foundations, Pile foundations, Pile cap.

UNIT-II: FLATSLABS

(08 Periods)

Properties of flatslabs, Behaviour of flatslab, Shear in flatslabs, Design of flatslabs.

UNIT-III: RETAINING WALLS

(09 Periods)

Lateral earth pressure, Design of cantilever and counterfort retaining walls.

UNIT-IV: WATERTANKS

(09 Periods)

Types of watertanks, IS Code provisions, Design of watertanks with flexible base and rigid base.

UNIT-IV: MISCELLANEOUS STRUCTURES

(09 Periods)

Design of Bunkers, Silos, Chimneys.

Total Periods: 45

TEXTBOOKS:

1. S. Unnikrishna Pillai and Devdas Menon, *Reinforced Concrete*
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2. *Design*, Tata Mc. Graw Hill, 3rd Edition, 2010.
S.K. Roy and N.C. Sinha, *Fundamentals of Reinforced Concrete*,
R. Chand & Company Ltd., 5th Edition, 2010.

REFERENCE BOOKS:

1. N. Krishna Raju and R.N. Pranesh, *Reinforced Concrete Design*,
CBS Publishers Distributors, 3rd Edition, 2010.
2. P.C. Varghese, *Limit State Design of Reinforced Concrete*,
Prentice Hall of India, 2nd Edition, 2010.
3. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Reinforced
Concrete structures – Vol. I*, Laxmi Publications Pvt. Ltd., 19th
Edition, 2010.
4. M.L. Gambhir, *Fundamentals of Reinforced Concrete Design*,
Printice Hall of India Pvt. Ltd., 2010.

CODES:

1. IS:456–2000: Plain and Reinforced Concrete,
2. IS:3370–2009: Concrete Structures for Storage of Liquids,
3. IS:4995(I&II): Criteria for Design of Reinforced Concrete
Bins for the Storage of Granular and Powdery Materials, **are to
be permitted into the examination hall.**

IIIB.TechIISemester

14BT60101: REINFORCED CEMENT CONCRETE STRUCTURES-II

Internal Marks	External Marks	Total Marks	L T P C
30	70	100	3 1 - 3

PREREQUISITES: RCCSI

COURSE DESCRIPTION: Structures–Foundations: strap, raft and piles– Retaining walls– Domes and water tanks– Silos and Chimneys.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

1. Explain the types of staircases, foundations and water tanks
2. Design staircase, foundation, retaining walls, water tanks, silos and chimney using IS code.
3. Suggest suitable type of foundation based on loading and soil conditions.

DETAILED SYLLABUS:

UNIT I (08 Periods)

STAIRCASES: Types of staircases–Stair spanning longitudinally and transversally

UNIT II (10 Periods)

FOUNDATIONS: Strap footing –Raft foundations–Design of piles and pile caps

UNIT III (09 Periods) RETAINING

WALLS: Lateral earth pressure–Design of cantilever and counterfort retaining walls.

UNIT IV (10 Periods) DOMES

AND WATER TANKS: Stresses in domes–membrane theory– design of dome– types of water tanks–IS Code provisions–Design of water tanks with flexible base and rigid base.

UNIT V (08 Periods)

MISCELLANEOUS STRUCTURES: Design of Silos–design of chimneys

Total Periods: 45

TEXTBOOKS

1. S. Unnikrishna Pillai and Devdas Menon, *Reinforced Concrete Design*, 3rd Edition, Tata Mc. Graw Hill, 2010.
2. P.C. Varghese, *Limit State Design of Reinforced Concrete*, 2nd Edition Prentice Hall of India, 2010.

REFERENCEBOOKS

1. N. C. Sinha and S. K. Roy, *Fundamentals of Reinforced Concrete*, 5th Edition, S. Chand & Company Ltd, 2010.
2. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Limit states design of Reinforced Concrete*, Laxmi Publications Pvt. Ltd., 2007.
3. N. Krishna Raju and R. N. Pranesh, *Reinforced Concrete Design*, 3rd Edition, CBS Publishers Distributors, 2010.
4. M. L. Gambhir, *Fundamentals of Reinforced Concrete Design*, Prentice Hall of India Pvt. Ltd., 2010.

III B.Tech. – II Semester (16BT60107) **ADVANCED SURVEYING**

(Programme Elective – 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Matrices and Numerical Methods, Engineering Physics, Surveying.

COURSE DESCRIPTION: Astronomical surveying; Construction and boundary surveys; Theory of errors; Land surveys; Triangulation and baseline measurements; GPS surveying.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Demonstrate the knowledge on advanced surveying techniques.
- CO2. Analyze advanced surveying techniques, tools and survey data.
- CO3. Prepare survey maps.
- CO4. Solve complex engineering survey problems through proper survey and interpretation.
- CO5. Use appropriate modern tools in advanced surveying practice.
- CO6. Follow ethics in surveying practice.
- CO7. Communicate effectively on advanced surveying issues in written and graphical forms.

DETAILED SYLLABUS:

UNIT-I: ASTRONOMICAL SURVEYING (08 Periods)

Astronomical coordinate systems, Terrestrial coordinate systems, Astronomical triangle, Determination of azimuth, Determination of latitude and longitude, Time correlations.

UNIT-II: CONSTRUCTION AND BOUNDARY SURVEYS

(09 Periods) Equipment for construction surveys, Setting out pipe line, Setting out buildings and structures, Setting out a highway.

UNIT-III: THEORY OF ERRORS AND LAND SURVEYS

(10 Periods) **Theory of Errors:** Types and sources of errors, Loss of accidental errors, Loss of weights, Theory of least squares, Method of weights, Method of correlates, Angle and station adjustment, Figure adjustment.

Land Surveys: Layouts, Measurements

UNIT-IV: TRIANGULATION AND BASELINE MEASUREMENTS

(10 Periods) Principle and classification of triangulation systems, Selection of baseline and stations, Orders of triangulation, Station marks, Signals, Towers,

Baseline measurement - Rigid bars, Flexible apparatus, Problems; Satellite station and reduction to centre.

UNIT-V: GPSSURVEYING (08 Periods)

Principles of GPS surveying and methods, Components of GPS- Space segment, Receiver segment, User segment; Errors in observations and corrections, Mapping with GPS, Application of GPS, Advantages over conventional methods, DGPS.

Total Periods: 45

TEXT BOOKS:

1. Arora, K.R., *Surveying – Vol. III*, Standard Book House, 11th Edition, 2013.
2. A.M. Chandra, *Higher Surveying*, New Age International (P) Limited, Publishers, 3rd Edition, 2015.

REFERENCE BOOKS:

1. S. K. Duggal, *Surveying – Vol. I and II*, Tata McGraw-Hill Publishing Co. Ltd., 4th Edition, 2013.
2. Arthur R. Benton and Philip J. Taetz, *Elements of Plane Surveying*, McGraw-Hill, 3rd Edition, 2010.
3. B.C. Punimia, Ashok K. Jain and Arun K. Jain, *Surveying – Vol. II*, Laxmi publications (P) Ltd., 17th Edition, 2016.
4. T.P. Kanetkar and S.V. Kulakarni, *Surveying and Leveling*, Pune Vidyarthi Griha Prakashan, Pune, 24th Edition, 2013.

III B.Tech. – II Semester (16BT60111)

STRUCTURAL HEALTH MONITORING

(Program Elective –1)

Int.Marks	Ext.Marks	TotalMarks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Basic Electrical and Electronics Engineering, Concrete Technology.

COURSE DESCRIPTION: Structural health monitoring; Non destructive testing of concrete structures; Sensors for health monitoring systems; SHM Techniques and systems; Information technology for health monitoring; SHM Applications in civil engineering.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Acquire the fundamental knowledge on structural health monitoring and its applications.
- CO2. Analyze smart materials, civil engineering structures and techniques for health monitoring.
- CO3. Recommend suitable solutions for structural health monitoring.
- CO4. Implement the modern tools and techniques in structural health monitoring.
- CO5. Ensure health and safety of the structures through structural health monitoring systems.
- CO6. Understand the impacts of the structural health monitoring on environment and sustainability.
- CO7. Follow ethics in choosing and implementing structural health monitoring systems and techniques.

DETAILED SYLLABUS:

UNIT-I: STRUCTURAL HEALTH MONITORING (08 Periods)

Need for SHM, SHM-Away for smart materials and structures, SHM and biomimetic-analog between the nervous system of a man and a structure with SHM, SHM as a part of system management, Passive and active SHM, NDE, SHM and NDECS, Basic components of SHM, Materials for sensor design.

UNIT - II: NON DESTRUCTIVE TESTING OF CONCRETE STRUCTURES

(10 Periods) Situations and contexts, Need, Classification of NDT procedures, Visual inspection, Half-Cell electrical potential methods, Schmidt rebound hammer test, Resistivity measurement, Electromagnetic methods, Radiographic testing, Ultrasonic testing, Infrared thermography, Ground penetrating radar, Radioisotope gauges, Other methods.

UNIT - III: SENSORS FOR HEALTH MONITORING SYSTEMS

(09 Periods) Acoustic emission sensors, Ultrasonic sensors, Piezoceramic sensors and actuators, Fibre optic sensors and Laser shearography techniques, Imaging techniques.

UNIT-IV: SHM TECHNIQUES AND SYSTEMS (09 Periods)

Diagnostic Techniques: Vibration signature analysis, Modal analysis, Neural network-based classification techniques.

Integrated Health Monitoring Systems: Intelligent health monitoring techniques, Neural network classification techniques, Extraction of features from measurements, Training and simulation techniques, Connectionist algorithms for anomaly detection, Multiple damage detection and case studies.

UNIT-V: IT FOR SHM AND SHM APPLICATIONS IN CIVIL ENGINEERING (09 Periods)

Information Technology for Health Monitoring: Information gathering, Signal analysis, Information storage, Archival, Retrieval, Security, Wireless communication, Telemetry, Real time remote monitoring, Network protocols, Data analysis and interpretation.

SHM Applications in Civil Engineering: Capacitive methods, Capacitive probe for cover concrete, SHM of a bridge, Applications for external post tensioned cables, Monitoring historical buildings.

Total Periods: 45

REFERENCE BOOKS:

1. Daniel Balageas, Claus-Peter Fritzen and Alfredo Guemes, *Structural Health Monitoring*, Published by ISTE Ltd., U.K. 2006.
2. Vistas M. Karbhari and Farhad Ansari, *Structural Health Monitoring of Civil Infrastructure System*, Woodhead Publishing Limited, Cambridge, 2009.
3. M.L. Wang, J.P. Lynch and H. Sohn, *Sensors Technologies for Civil Infrastructure*, Vol. 1 & 2, Woodhead Publishing Limited, Cambridge, 2009.
4. Philip, W., *Industrial Sensors and Applications for Condition Monitoring*, MEP, 1994.
5. Armer, G.S.T (Editor), *Monitoring and Assessment of Structures*, Spon, London, 2001.
6. J. Prasad and C.G.K. Nair, *Non-destructive Test and Evaluation Materials*, McGraw-Hill, 2nd Edition, 2011.
7. Poonam I. Modi and Chirag N. Patel, *Repair and Rehabilitation of Concrete Structures*, Prentice-Hall of India Pvt. Ltd., New Delhi, 2016.

III B.Tech. – II Semester

(16BT60112) BUILDING MAINTENANCE AND REPAIR

(Open Elective)
(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Durability of buildings, Failure and repair of buildings, Material Techniques for repair, Maintenance of buildings, Conservation and recycling.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Acquire basic knowledge on durability and serviceability, failures, repair and rehabilitation of buildings.
- CO2. Analyze failures, repair and rehabilitation techniques.
- CO3. Solve complex building maintenance problems through proper investigations and interpretation.
- CO4. Use modern tools and techniques for various repairs and rehabilitation of structures.
- CO5. Provide solutions for building maintenance and repair problems considering health and safety.
- CO6. Consider environmental sustainability in building maintenance and repair.
- CO7. Maintain ethical standards for quality in repairs and rehabilitation of structures.
- CO8. Evaluate specifications and perform cost analysis of building components while repair and rehabilitation.

DETAILED SYLLABUS:

UNIT – I: DURABILITY AND SERVICEABILITY OF BUILDINGS

(10 Periods) Life expectancy of different types of buildings; Effect of environmental elements such as heat, dampness, frost and precipitation on buildings; Effect of chemical agents on building materials, Effect of pollution on buildings, Effect of fire on building; Damage by biological agents like plants, trees, algae, fungus, moss, insects, etc.; Preventive measures on various aspects, Inspection, Assessment procedure for evaluating for damaged structures, Causes of deterioration, Testing techniques.

UNIT – II: FAILURE AND REPAIR OF BUILDINGS

(10 Periods)

Building failure – Types, Methodology for investigation; Diagnostic testing methods and equipment, Repair of cracks in concrete and masonry, Materials for Repair, Methods of repair, Repair and strengthening of concrete buildings, Foundation repair and strengthening, Underpinning, Leakage of roofs and repair methods.

UNIT – III: TECHNIQUES FOR REPAIR **(08 Periods)**

Rust eliminators and polymers coating for rebars during repair, Foamed concrete,

Mortar and dry pack, Vacuum concrete, Gunite and shotcrete, Epoxy injection, Mortar repairs for cracks, Shoring and underpinning.

UNIT-IV: MAINTENANCE OF BUILDINGS (09 Periods)

Reliability principles and its applications in selection of systems for building, Routine maintenance of building, Maintenance cost, Specifications for maintenance works, Dampness-Damp proof courses, Construction details for prevention of dampness; Termite proofing, Fire protection, Corrosion protection.

UNIT-V: CONSERVATION AND RECYCLING (08 Periods)

Performance of construction materials and components in service, Rehabilitation of constructed facilities, Conservation movement, Materials and methods for conservation work, Recycling of old buildings and its advantages, Examples.

Total Periods: 45

TEXT BOOKS:

1. Dennison Campbell, Allen and Harold Roper, *Concrete Structures – Materials, Maintenance and Repair*, Longman Scientific and Technical, UK, 1991.
2. Allen, R. T. L., Edwards, S. C. and J. D. N. Shaw, *The Repair of Concrete Structures*, Blackie Academic & Professional, UK, 1993.

REFERENCE BOOKS:

1. Peter H. Emmons, *Concrete Repair and Maintenance*, John Wiley and Sons Publications, 2002.
2. Building Construction under Seismic Conditions in the Balkan Region, UNDP/UNIDO Project Rer/79/015, Volume 5, *Repair and Strengthening of Reinforced concrete, Stone and Brick Masonry Buildings*, United Nations Industrial Development Organisation, Vienna.
3. Shetty, M. S., *Concrete Technology*, S. Chand and Company.
4. Smith, P. and Julian, W., *Building Services*, Applied Science Publications, London, 1976.
5. SP:25, BIS; *Causes and Prevention of Cracks in Buildings*.
6. Champion, S., *Failure and Repair of Concrete Structures*, John Wiley and Sons Publications, 1961.
7. Perkins, P. H., *Repair, Protection and Water Proofing of Concrete Structures*, E&FNSpon, UK, 3rd Edition, 1997.

III B.Tech - II Semester (16BT60115) ENVIRONMENTAL POLLUTION AND CONTROL

(Open Elective)
(Common to CSE, CSSE, IT, CE & ME)

Int.Marks	Ext.Marks	TotalMarks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Fundamentals of air pollution; Dispersion of pollutants; Effects and control of air pollution; Water pollution; Soil pollution and control; Municipal solid waste management.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Demonstrate knowledge on air, water, soil pollution and their control and solid waste management.
- CO2. Analyze causes and effects of air, water and soil pollution and their remedial measures.
- CO3. Recommends suitable solutions to complex environmental pollution problems.
- CO4. Use appropriate remedial techniques to solve environmental pollution problems.
- CO5. Understand the effects of environmental pollution on human health and vegetation.
- CO6. Encourage sustainable development through implementation of pollution control measures.
- CO7. Maintain IS Codes for environmental quality control.

DETAILED SYLLABUS:

UNIT-I: AIR AND NOISE POLLUTION

(08 Periods)

Air Pollution: Scope, Significance, Classification, Sources – Line, Area, Stationary, Mobile; Effects of air pollutants on man, material and vegetation; Global effects of air pollution; Air pollution meteorology – Lapserate, Inversion, Plume pattern; Dispersion of air pollutants – Dispersion models and applications; Ambient air quality standards. **Noise Pollution:** Sound pressure, Power and intensity, Impact of noise, permissible limit of noise pollution, measurement of noise.

UNIT-II: AIR AND NOISE POLLUTION CONTROL

(10 Periods)

Self-cleansing properties of the environment, Dilution method, Control at source, Process changes and equipment modifications, Control of particulates – Types of equipment, Design and operation – Settling chambers, Centrifugal separators, Bag house filters, Wet scrubbers, Electrostatic precipitators; Control of gaseous pollutants – Adsorption, Absorption, Condensation, Combustion; Control of air pollution from automobiles, Control of noise pollution.

UNIT-III: WATER POLLUTION AND CONTROL

(10 Periods)

SVEC16 - B.TECH - CIVIL ENGINEERING

Water pollution–Sources, Causes, Effects; Surface and groundwater quality–Physical, Chemical, Biological; Drinking water quality standards, Water purification

- Processes, Engineered systems–Aeration, Solids separation, Settling operations, Coagulation, Softening, Filtration, Disinfection; Wastewater–Sources, Causes, Effects, Treatment and disposal–Primary, Secondary, Tertiary; Case studies.

UNIT–IV: SOIL POLLUTION AND CONTROL

(08 Periods)

Soil pollutants, Sources of soil pollution, Causes, Effects and control of soil pollution, Diseases caused by soil pollution, Methods to minimize soil pollution, Effective measures to control soil pollution, Case studies.

UNIT–V: MUNICIPAL SOLID WASTE MANAGEMENT

(09 Periods)

Types of solid waste, Composition of solid waste, Collection and transportation of solid waste, Methods of disposal–Open dumping, Sanitary landfill, Composting, Incineration, Utilization–Recovery and recycling, Energy Recovery.

Total Periods: 45

TEXTBOOKS:

1. Peavy, H.S, Rowe, D.R., and Tchobanoglous, G., *Environmental Engineering*, McGraw-Hill Inc., 1985.
2. C.S.Rao, *Environmental Pollution Control Engineering*, New Age International Pvt. Ltd., 2nd Edition, 2007.
3. Ibrahim A. Mirsa, *Soil Pollution: Origin, Monitoring & Remediation*, Springer, UK, 2nd Edition, 2008.

REFERENCE BOOKS:

1. M.N. Rao and H.V. N. Rao, *Air Pollution*, Tata McGraw–Hill Education Pvt. Ltd., 19th Edition, 2010.
2. Daniel Vallero, *Fundamentals of Air Pollution*, Academic Press (Elsevier), 5th Edition, 2014.
3. S.M. Khopkar, *Environmental Pollution Monitoring and Control*, New Age International Pvt. Ltd., 2nd Edition, 2007.
4. V.M. Domkundwar, *Environmental Engineering*, Dhanpat Rai & Co. Pvt. Ltd., New Delhi, 2014.

IVB.Tech I Semester
(14BT70106) ENVIRONMENTAL POLLUTION AND CONTROL
(Open Elective)

(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Environmental Sciences

COURSE DESCRIPTION: Introduction, Sources and Effects of Air Pollution

- Dispersion of Pollutants and their control - Surface and Ground Water Pollution and control - Soil Pollution and remediation - Management of Municipal Solid Wastes.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

1. Explain various pollutants, characteristics and their dispersion
2. Analyze the major pollutants that cause environmental pollution.
3. Conduct research and select suitable techniques to control pollution.
4. Understand the effects of environmental pollution on human beings and vegetation
5. Communicate the methods of management and control of environmental pollution

DETAILED SYLLABUS:

UNIT I (08 Periods)

INTRODUCTION TO AIR POLLUTION AND DISPERSION OF POLLUTANTS:

Scope - Air Pollutants - Classifications - Natural and Artificial - Primary and Secondary, Point and Non-Point, Line and Area Sources of Air Pollution - Stationary and Mobile Sources - Dispersion of Pollutants - Dispersion Models - Applications.

UNIT II (09 Periods)

EFFECTS AND CONTROL OF PARTICULATES: Effects of Air Pollutants on

Man, Material and Vegetation - Global Effects of Air Pollution - Green

House Effect, Heat Island, Acid Rains, Ozone Holes - Control of Particulates

- Control at Sources - Process Changes - Equipment Modifications -

Design and Operation of Control Equipment - Settling Chambers - Centrifugal Separators - Bag Filters, Dry and Wet Scrubbers - Electrostatic Precipitators.

UNIT III**(10 Periods) WATER**

POLLUTION: Introduction–Water Quality in Surface Waters– Nutrients– Controlling Factors in Eutrophication– Effects of Eutrophication – Ground Water Pollution– Thermal Pollution– Marine Pollution– Sewage Disposal in Ocean– Types of Marine Oil Pollution– Cleanup of Marine Oil Pollution– Control of Water Pollution– Case Study on Tanneries– Drinking Water Quality Standards.

UNIT IV**(09 Periods)**

SOIL POLLUTION: Soil Pollutants– Sources of Soil Pollution– Causes of Soil Pollution and their Control– Effects of Soil Pollution– Diseases Caused by Soil Pollution– Methods to Minimize Soil Pollution– Effective Measures to Control Soil Pollution– Case Study on Fertilizer.

UNIT V**(09 Periods)**

MUNICIPAL SOLID WASTE MANAGEMENT: Introduction – Types of Solid Wastes – Principles of Excreta Disposal – Domestic Solid Waste Production – Collection of Solid Wastes – Transport of Solid Wastes – Management of Solid Wastes – Methods of Land Disposal – Sanitary Landfill – Composting – Incineration.

Total Periods: 45**TEXTBOOKS**

1. C.S.Rao, *Environmental Pollution Control Engineering*, 2nd Edition, New Age International Pvt Ltd., 2007.
2. Y. Anjaneyulu, *Introduction to Environmental Science*, 1st Edition, BS Publications., 2009.

REFERENCE BOOKS

1. M.N.Rao and H.V.N.Rao, *Air Pollution*, 19th Edition, Tata McGraw– Hill Education Pvt.Ltd., 2010.
2. Daniel Vallero, *Fundamentals of Air Pollution*, 5th Edition, Academic Press (Elsevier), 2014.
3. S.M.Khopkar, *Environmental Pollution Monitoring and Control*, 2nd Edition, New Age International Pvt Ltd., 2007.
4. S.Deswal and K.Deswal, *Environmental Science*, 2nd Edition, Dhanpat Rai & Co, 2011.

III B.Tech. – II Semester
(16BT60131) COMPUTERAIDED DESIGN AND
DETAILING LAB

Int.Marks	Ext.Marks	TotalMarks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on Reinforced Cement Concrete Structures, Design of Steel Structures.

COURSE DESCRIPTION: Exercises on Analysis and design of Simple beams; 2-D and DRCC Frames; Trusses; Solid slabs; Retaining walls; Water tanks; Plate Girder Bridges. 3-

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Explain the knowledge on computer aided design of RCC and steel structures using software tools.
- CO2. Analyze RCC and steel structures using software tools.
- CO3. Design RCC and steel structures using software tools.
- CO4. Solve complex RCC and steel structural design problems using software tools and suggest suitable solutions.
- CO5. Use appropriate techniques in modeling, analysis and design of RCC and steel structures using software tools.
- CO6. Apply contextual knowledge to assess the safety and serviceability of the structures designed.
- CO7. Follow relevant IS Codes for the design of RCC and steel structures using software tools.
- CO8. Function effectively as an individual and as a team member in the design of RCC and steel structures using software tools.
- CO9. Communicate effectively on the design of RCC and steel structures using software tools in written, oral and graphical forms.

DETAILED SYLLABUS:

SOFTWARE: STAAD.Pro or any other industry popular structural analysis and design softwares.

LIST OF EXERCISES

1. Analysis and design of simply beams
 - a) Simply supported beam
 - b) Cantilever beam
 - c) Continuous beam
 - d) Fixed beam
2. 2-DRCC Frame analysis and design
3. 3-DRCC Frame analysis and design
4. Analysis and design of Steel Truss
 - a) Howe roof truss
 - b) Howe bridge truss
 - c) Warren truss
 - d) Pratt truss
5. Simple tower analysis and design
6. Analysis and design of solid slab

7. Retaining wall analysis and design
8. Design of RCC Tee beam bridges for IRC loading
9. Analysis and design of INTZ type water tank
 - a) Circular water tanks
 - b) Rectangular water tanks
10. Analysis and design of plate girder bridge

TEXTBOOKS:

1. V.L. Shah and S. R. Karve, *Illustrated Design of Reinforced Concrete Building*, Structures Publication, Pune, 7th Edition, 2014.
2. Krishnamurthy. D., *Structural Design and Drawing*, Vol-II and Vol-III, CBS Publishers and Distributors, Delhi, 1992.

REFERENCE BOOKS:

1. IS 456-2000
2. IS 800-2007
3. IS 875 Part-I, II & III-2000
4. Relevant IRC Code.
5. SP-16-1980: *Design Aids for Reinforced Concrete*, Bureau of Indian Standards, New Delhi.
5. SP-34-1987: *Hand Book on Concrete Reinforcement and Detailing*, Bureau of Indian Standards, New Delhi.

IVB.TechISemester
14BT70122:COMPUTERAIDEDDESIGN ANDDETAILINGLAB

Internal Marks	External Marks	Total	L	T	P	C
25	50	75	-	-	3	2

Prerequisites: Engineering Graphics, RCCS-I &II

CourseDescription: SimpleBeamsand2-D,3DFrameAnalysis.

Course Outcomes:

After completion of the course, a successful student will be able to:

1. Acquire knowledge on the theoretical concepts of analysis, design and use of software.
2. Analyze structure under different loading conditions.
3. Estimate the reinforcement required and sizes of different members using Stadd-Pro.
4. Use Stadd-Pro for the analysis and design of structures
5. Prepare drawings with detailed report of a building for the necessary approvals.

LIST OF EXPERIMENTS:

1. Analysis of simple beams
2. 2-D Frame Analysis and design
3. Steel tabular truss analysis and design
4. 3-D Frame Analysis and design
5. Retaining wall analysis and design
6. Simple tower analysis and design
7. Analysis and design of INTZ type water tank, circular and rectangular water tanks
8. Analysis and design plate girder bridge

REFERENCE

1. IS 456- 2000
2. IS 800- 2007
3. IS 875 Part-I, II & III -2000

III B.Tech. II Semester

(16BT60132) HIGHWAY ENGINEERING LAB

Int.Marks	Ext. Marks	TotalMarks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Course on Highway and Traffic Engineering.

COURSE DESCRIPTION: Highway material testing – Aggregates, Bituminous materials, Bituminous mixes; Pavement evaluation; Traffic studies.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Demonstrate practical knowledge on highway material testing, pavement evaluation and traffic studies.
- CO2. Characterize highway materials, pavements and traffic.
- CO3. Design bituminous mix for pavements.
- CO4. Solve complex engineering problems associated with highway materials, pavements and traffic through suitable investigations.
- CO5. Use modern tools and techniques appropriate in highway material testing, pavement evaluation and traffic studies.
- CO6. Ensure health and safety in highway material testing, pavement evaluation and traffic studies.
- CO7. Encourage sustainable and environmental friendly highway materials, pavement evaluation methods and traffic studies.
- CO8. Maintain ethical standards for quality in highway material testing, pavement evaluation and traffic studies following relevant IS codes.
- CO9. Function effectively as an individual, and as a member or leader in teams to solve highway and traffic engineering problems.
- CO10. Communicate effectively on highway material testing, pavement evaluation and traffic studies in written, oral and graphical forms.
- CO11. Promote cost effective highway materials.

LIST OF EXPERIMENTS:

(A) AGGREGATES

1. Sieve analysis of aggregates
2. Shape test and angularity number test for coarse aggregate
3. Aggregate crushing value test and 10% fines value
4. Aggregate impact test
5. Attrition test for coarse aggregate
6. Abrasion test for coarse aggregate
7. Specific gravity and water absorption test

(B) BITUMINOUS MATERIALS

8. Penetration test
9. Ductility test
10. Softening point test
11. Flash and fire point test
12. Viscosity test
13. Specific gravity test

(C) BITUMINOUS MIXES

14. Marshall stability test on Marshall bituminous mix design
15. Stripping value test of coated bituminous mix
16. Theoretical maximum specific gravity (G_{mm}) of bituminous mix test
17. Bitumen extraction and determination of bitumen content and gradation of aggregates

(D) PAVEMENT EVALUATION

18. Field CBR test for subgrade strength
19. Benkelman beam deflection studies on flexible pavement and analysis
20. Measurement of unevenness/roughness by Bump Integrator

(E) TRAFFIC STUDIES

21. Spot speed studies
22. Traffic volume studies at mid-block section and at typical intersections

TEXT BOOKS:

1. Khanna, S.K., Justo, C. E. G. and Veeraragavan, A., *Highway Materials and Pavement Testing*, Nem Chand & Bros, Roorkee, Revised 5th Edition, 2009.
- Khanna, S. K., Justo, C. E. G. and Veeraragavan, A.,
2. *Highway Engineering*, Nem Chand & Bros, Roorkee, Revised 10th Edition, 2014.

Note: A minimum of fourteen experiments are to be performed covering all sections.

IIIB.TechIISemester
14BT60121: CONCRETE AND HIGHWAY MATERIALS LAB

Internal Marks	External Marks	Total	L	T	P	C
25	50	75	-	-	3	2

PREREQUISITES: Transportation Engineering–I

COURSE DESCRIPTION: Testing of Aggregates, Cement and Bituminous material; Testing of Concrete and Bituminous mixes

COURSE OUTCOMES:

After completion of this course, a successful student will be able to:

1. Perform standard tests on Aggregates and Cements used in Buildings and Highway construction
2. Evaluate the quality and performance of Aggregates, Cement and Bituminous material and select suitable materials used in Buildings and Highway construction
3. Test and design Concrete and Bituminous mixes
4. Function effectively as a member or leader in teams to solve highway engineering problems
5. Communicate the properties of building and highway materials through a report after testing

LIST OF EXPERIMENTS:

I. AGGREGATES

1. Aggregate crushing value
2. Aggregate impact test
3. Specific gravity and water absorption
4. Attrition test
5. Abrasion test
6. Shape tests
7. Bulking of Sand

II. BITUMINOUS MATERIALS

1. Penetration test
2. Ductility test
3. Softening point test
4. Flash and fire point tests
5. Bituminous Mix Design and testing using Marshall Stability Testing Machine

III. CEMENT AND CONCRETE

1. Normal consistency and fineness of cement
2. Initial setting time and final setting time of cement.
3. Specific gravity and soundness of cement
4. Compressive strength of cement
5. Workability test on concrete by Compaction factor, Slump and Vee-bee
6. Young's modulus and compressive strength of concrete
7. Concrete Mix Design and Testing

IV B.Tech. – I Semester

(16BT70103) RAILWAY, AIRPORT AND HARBOUR ENGINEERING

Int. Marks	Ext. Marks	Total Marks
30	70	100

L	T	P	C
3	1	-	3

PRE-REQUISITES: Course on Highway and Traffic Engineering.

COURSE DESCRIPTION: Railway Engineering; Construction and maintenance of railway tracks; Airport planning; Airport design; Harbour engineering.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Demonstrate the basic knowledge on railway, airport and harbour engineering.
- CO2. Analyze railway, airport and harbour engineering problems.
- CO3. Design elements of railways and airports.
- CO4. Solve problems associated with railway, airport and harbour engineering through proper investigations, analysis and interpretation.
- CO5. Use appropriate techniques in solving railway, airport and harbour engineering problems.
- CO6. Provide solutions to railway, airport and harbour engineering problems considering health and safety in the context of society.
- CO7. Consider the environmental issues while solving railway, airport and harbour engineering problems.
- CO8. Follow standards for planning and design of Railways, Airports and Harbours.

DETAILED SYLLABUS:

UNIT-I: RAILWAY ENGINEERING

(10 Periods)

Development of railways in India, Advantages of railways, Classification of Indian railways, Permanent way – Cross section, Components, Functions; Rail joints, Welding of rails, Concept of gauges, Coning of wheels, Creep of rails, Adzing of sleepers, Route alignment surveys - Conventional and modern methods; Soil suitability analysis, Track geometric design, Points and crossings, Signals, Interlocking.

UNIT - II: CONSTRUCTION AND MAINTAINANCE OF RAILWAY TRACKS

(08 Periods) Earthwork, Stabilization of track on poor soil, Drainage, Calculation of materials required for track laying, Construction and maintenance of tracks, Modern methods of construction and maintenance, Railway stations and yards and passenger amenities, Urban rail, Infrastructure for metro, mono and underground railways.

UNIT-III: AIRPORT PLANNING

(10 Periods)

Air transport characteristics, Aircraft characteristics, Airport classification, Air port planning - Objectives, Components, Layout characteristics; Airport site selection - Site surveys and drawings; Terminal area - Functions, Site location; Noise control, Aprons, Gate positions and parking system, Airport markings, Airport lighting, Typical layouts.

UNIT-IV: AIRPORT DESIGN

(09 Periods)

SVEC16 - B.TECH - CIVIL ENGINEERING

Runway design – Orientation, Wind rose diagram, Length, Geometric design, Configuration and pavement design principles, Lightings system; Airport grading, Elements of taxiway design, Airport zones, Passenger facilities and services, Runway and taxiway markings and lighting, Characteristics and requirements of airport drainage.

UNIT-V: HARBOUR ENGINEERING

(08 Periods)

Significance, Advantages and limitations of water transport, Harbour-Classification and site selection, Port – Layout, Components, Functions, Classification, Site selection; Docks-Types, Functions; Inland water transport, Natural phenomenon – Tides, Winds, Waves, Currents, Drift; Navigational aids.

Total Periods: 45

TEXTBOOKS:

1. S.P. Saxena and S.P. Arora, *Railway Engineering – A Text Book of Transportation Engineering*, S. Chand and Co. Ltd., 7th Edition, 2010.
2. Khanna, S.K., Arora, M.G., and Jain, S.S. *Airport planning and Design*, Nem Chand and Bros, 6th Edition, 2012.
3. S. C. Rangwala, *Harbor Engineering*, Charotar Publishing House, 7th Edition, 2013.

REFERENCE BOOKS:

1. Chandra S. and M.M. Agarwal, *Railway Engineering*, Oxford University Press, 2nd Edition, 2007.
2. S.K. Khanna and Arora, *Airport Planning and Design*, Nemchand and Brothers, 6th Edition, 2012.
3. Seetharaman, S., *Dock and Harbour Engineering*, Umesh Publications, 1999.

IVB.Tech IISemester
14BT80114: RAILWAY, HARBOUR AND AIRPORT ENGINEERING

[PROFESSIONAL ELECTIVE –IV]

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Surveying, Soil Mechanics

COURSE DESCRIPTION: Railway, Airport, Harbor: Development and Planning – Siting Considerations – Geometric Design – Alignment and Drainage – Construction and Equipment. Railway Engineering: Tracks, Curves, Alignment. Airport Engineering: Runway & Lighting Systems – Tunneling

COURSE OUTCOMES:

After the completion of the course, a successful student will be able to:

1. Acquire knowledge on railway engineering, airport and harbor engineering.
2. Assemble, analyze, and appropriately apply transportation engineering data from existing graphics, reports, and other documents.
3. Design of Railway Tracks, airport runway and layout of harbor, tunnels and Geometrics and other components & maintenance and safety aspects
4. Understand the safety and maintenance aspects of railway tracks, runway, harbours and tunnels.

DETAILED SYLLABUS:

UNIT I (08 Periods)

RAILWAY ENGINEERING: Railway terminology – railway track – rails – rail joints and welding of rails – creep of rails – sleepers – track fittings and fastenings – ballast – subgrade and embankments – points and crossings – construction and renewal of track – track drainage – maintenance of track – safety in railways – modernization of tracks for high speeds –

UNIT II (09 Periods)

GEOMETRIC DESIGN OF RAILWAY TRACK: necessity of design of a railway track – ruling gradient, Gradient and grade compensation: momentum gradient, Pusher or Helper gradient, Gradient in station yards, Grade compensation on curves – speed of the train, safe speed on curves – Radius of degree of curve – Superelevation or cant: Object of providing superelevation, Relationship of superelevation, gauge, speed and radius of curve, average speed, limits of superelevation, cant deficiency, negative superelevation – curves: necessity, effects of curvature, types of curves, necessity of providing transition curve, types of transition curves, length of transition curves – Realignment of curves by stringline method: procedure for stringlining the curves, computation of slews or shifts, slewing curve to the head adjustment – widening of gauge on curves, shift

UNIT III (10 Periods) AIRPORT

ENGINEERING: Airport planning – Airport characteristics – airport obstructions – airport capacity and configuration – taxiway design –

structural design of airport pavements – maintenance and rehabilitation of airfield pavements – visual aids – airport grading and drainage – environmental guidelines for airport projects

UNIT IV

(09 Periods)

DOCKS AND HARBOURS: Dry docks and Spillways – Transition shed and warehouses – Quays, jetties and wharfs – tide, wind and wave – Dry docks (repair dock) – maintenance dredging – maintenance of ports and harbours – navigational aids

UNIT V

(09 Periods)

TUNNELING: Tunnels – Tunnel Surveying – Methods of Tunneling in soft strata, Pneumatic process or compressed air methods – Tunneling in rock – safety precautions in tunneling work – tunnelling – shafts and caissons in tunneling – tunnel drainage – tunnel ventilation, dust prevention and lighting – tunneling for underground railway and tube railway – tunnels conveying water

Total Periods : 45

TEXT BOOKS:

1. S.C.Saxena, S.P. Arora, a Text Book of *Railway Engineering*, 7th Edition, Dhanpat Rai Publications Pvt Ltd, New Delhi, 2014.
2. S.K.Khanna and Arora, *Airport Planning and Design*, 6th Edition, Nemchand Brothers, 2012

REFERENCE BOOKS

1. KK Chitkara, *Construction Project Management: Planning, Scheduling and Controlling*, Tata McGraw Hill Education Pvt. Ltd., 2010
2. SP Chandola, *A Textbook of Transportation Engineering*, S Chand & Co Ltd, 2011

IV B. Tech. – I Semester (16BT70107) GLOBAL POSITIONING SYSTEM

(Program Elective –2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Physics.

COURSE DESCRIPTION: Geodesy; Overview of Global Positioning System (GPS); GPS signal structure; GPS Errors and accuracy; GPS surveying and applications.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Demonstrate the knowledge on geodesy, GPS signal structure, GPS errors and accuracy, GPS surveying and applications for civil engineering structures.
- CO2. Analyze problems associated with GPS and GPS surveying.
- CO3. Conduct investigations and give recommendations for boundary and locations, specific lands surveying issues.
- CO4. Use modern methods and apply suitable techniques in collecting waypoints, recording tracks, navigating to a position.
- CO5. Consider societal issues in practicing GPS survey.
- CO6. Follow ethics in GPS survey practice.
- CO7. Understand and manage projects on global positioning satellite data interface and relation in multidisciplinary environments.

DETAILED SYLLABUS:

UNIT – I: GEODESY (09 Periods)

Fundamentals of geodesy, Earth geoid and ellipsoid, Reference surface, geodetic systems, Indian geodetic system, Coordinate systems and transformations.

UNIT – II: OVERVIEW OF GLOBAL POSITIONING SYSTEM

(08 Periods)

NAVSTAR GPS, GLONASS, Indian regional navigational satellite system, Segments of GPS, Blocks of GPS-Block I, II/IIA; Advantages and current limitations of GPS.

UNIT – III: GPSSIGNAL STRUCTURE

(09 Periods)

Carriers, GPS codes - C/A, P, Navigational message; GPS receiver - Types and structure of receivers; Principles of GPS position fixing, Pseudo ranging.

UNIT – IV: GPS ERRORS AND ACCURACY

(09 Periods)

Satellite dependent - Ephemeris errors, Satellite clock bias, Selective availability; Receiver dependent - Receiver clock bias, Cycle slip, Selective availability; Observation medium dependent: Ionospheric errors, Tropospheric errors; Station dependent - Multipath, Station coordinates; Satellite geometry based measures - Geometry dependent (Dilution of Precision: DOP), User equivalent range error.

UNIT – V: GPS SURVEYING AND APPLICATIONS (10 Periods)

Static surveying and kinematic surveying, DGPS survey, Preparation of GPS surveys- Setting up an observation plan, Observation strategies, Network design; GPS applications- Cadastral surveys, Remote sensing and GIS, Military applications and vehicle tracking, Infrastructure development, Natural disasters.

Total Periods: 45

TEXTBOOKS:

1. Sateesh Gopi, *Global Positioning Systems – Principles and Applications*, McGraw-Hill Education (India) Pvt. Ltd., 2014.
2. Akash Deep Sharma, *Global Positioning System*, MD Publication Pvt. Ltd., New Delhi (India), 2008.

REFERENCE BOOKS:

1. Gunter Seeber, *Satellite Geodesy*, Walter de Gruyter, Berlin (Germany), 2003.
2. Pratap Misra and Per Enge, *Global Positioning System*, Ganga Jamuna Press, 2006.
3. Bradford, W. Parkinson and James J. Spiker Jr., *Global Positioning System: Theory and Applications*, Vol I and II, American Institute of Aeronautics and Astronautics: Washington (USA), 1996.
4. Hofmann-Wellenhof, B., Lichtenegger, H. and Collins, J., *Global Positioning System: Theory and Practice*, Springer, Berlin (Germany), 1994.

IV B.Tech. - I Semester (16BT70109)

TRANSPORTATION PLANNING AND MANAGEMENT

(Program Elective –2)

Int.Marks	Ext.Marks	TotalMarks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on Highway and Traffic Engineering.

COURSE DESCRIPTION: Transportation planning; Transport demand analysis; Traffic assignment; Landuse transport models and theory of traffic flow; Transport economics; Public transportation-mass transit systems; Scheduling; Planning; Softwares.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Demonstrate the knowledge on transportation planning and management.
- CO2. Analyze problems associated with transportation planning and management.
- CO3. Develop transportation plans and management systems.
- CO4. Solve complex problems in transportation planning and management through proper investigations, analysis and interpretation.
- CO5. Use appropriate tools and techniques in transportation planning and management.
- CO6. Consider societal issues in transportation planning and management.
- CO7. Provide solutions to transportation planning and management problems considering environment.
- CO8. Maintain ethics in transportation planning and management practice.
- CO9. Consider economical issues in transportation planning and management.

DETAILED SYLLABUS:

UNIT-I: TRANSPORTATION PLANNING (08 Periods)

Transportation planning process, System approach to transportation planning, Stages in transportation planning and difficulties in transportation planning process - Transportation survey, Study area, Zoning; Types of surveys - Inventory of transportation facilities; Land use and economic activities.

UNIT-II: TRANSPORT DEMAND ANALYSIS (09 Periods)

Trip purpose - Factors governing trip generation and attraction, Multiple linear regression analysis; Trip distribution models - Gravity model, Modal split models, Probit analysis, Traffic assignment models; Travel demand forecasting, Trip generation analysis, Trip classification - Multiple regression analysis, category analysis, modal split analysis; Trip distribution analysis - Method of trip distribution, Uniform and average factor method, Fratar method, Furness method, Gravity model; Linear programming approach to trip distribution.

UNIT-III: TRAFFIC ASSIGNMENT, LAND USE TRANSPORT MODELS AND THEORY OF TRAFFIC FLOW (09 Periods)

Traffic Assignment: Purpose, Techniques - All or nothing assignment, Multiple route assignment, Capacity restraint assignment; Diversion curves, Route building algorithms

Land use Transport Models: Selection of land, Lowry model, Grain-Lowry model, Applications of Lowry model.

Theory of Traffic Flow: Scope, Definitions and basic relationship, Hydrodynamic analogies, Car following theory, Probabilistic description of traffic flow, Queuing theory as applied to traffic flow problems for study state conditions, Simulation studies.

**UNIT-IV:TRANSPORTECONOMICSANDPUBLICTRANSPORTATION-
MASSTRANSITSYSTEMS (08Periods)**

Transport Economics: Economic evaluation of highway schemes, Necessity, Cost and benefits of transportation projects, Basic principles of economic evaluation - Net present value method, Benefit/Cost ratio method, Internal rate of return method; Vehicle operating costs, Value of travel time saving, Accident costs.

Public Transportation-Mass Transit Systems: Bus and rail transit, characteristic capacities - Introduction to advanced computational techniques for transportation planning.

UNIT-V:SCHEDULING,PLANNINGANDSOFTWARES (11Periods)

Scheduling: Grouping of plant and machinery; Incorporating in project planning; Preparation of plant schedule.

Planning: WBS, Network development, Resource allocation, Planning and controlling of resources.

Softwares: Primavera and MS Project.

Total Periods: 45

TEXT BOOKS:

1. Kadyali, L. R., *Traffic Engineering and TransportationPlanning*, Khanna Publications, 7th Edition,2012.
2. Chitkara, K. K., *Construction Project Management:Planning, SchedulingandControlling*, TataMcGraw-HillEducationPvt.Ltd., 3rd Edition,2010.

REFERENCE BOOKS:

1. Saxena, S. P. and Arora, S. P. *Railway Engineering - A Text BookofTransportationEngineering*, S.ChandandCo.Ltd.,7th Edition,2010.
2. Chandola, S. P., *A Text Book of Transportation Engineering*, S. Chand & Co Ltd,2011.
3. Par tha Chakraborty and Animesh Das, *Principlesof TransportationEngineering*, PrenticeHall of IndiaPvt.Ltd,2005.
4. Papacostas, C. S. and Prevedouros, P. D., *Transportation Engineering and Planning*, Prentice Hall of India Pvt. Ltd.,2006.

IVB.Tech I Semester
14BT70113: TRANSPORTATION MANAGEMENT

(PROFESSIONAL ELECTIVE –II)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Transportation Engineering–I

COURSE DESCRIPTION: Transportation Planning and Management– Traffic Assessment, Land use transport models, Theory of Traffic flow– Transportation economics, Public Transportation –Mass Transit System– Construction plant, Machinery, Tools and Vehicles used in Transportation Projects.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

1. Acquire the knowledge on the transportation planning and management.
2. Assemble, analyze, and appropriately apply transportation engineering data from existing graphs, reports, and other documents.
3. Use Statistical methods and Electronic technology to support the planning, design, operation and management of transportation facilities and projects.
4. Apply latest techniques in Planning and Controlling of Transportation Projects.

DETAILED SYLLABUS:

UNIT I

(09 Periods)

TRANSPORTATION PLANNING AND MANAGEMENT: Introduction to the process of urban transport planning– Travel demand forecasting – Trip generation analysis– Trip classification– Multiplex regression analysis– Category analysis – Modal split analysis: introduction, earlier modal split models, modal split models with behavioral basis– Trip distribution analysis: introduction, methods of trip distribution, uniform and average factor method, Fratar method, Furness method, The Gravity model, Intervening and competing, Linear programming approach to trip distribution.

UNIT II

(09 Periods)

TRAFFIC ASSIGNMENT: Purpose of traffic assignment– Assignment techniques– All or nothing assignment– Multiplex route assignment– Capacity restraint assignment– Diversion curves– Route building algorithms.

LAND USE TRANSPORT MODELS: Introduction, selection of Land–use transport models, The Lowry model, Grain–Lowry model, Applications of Lowry model.

THEORY OF TRAFFIC FLOW: Scope, definitions and basic relationship, review of flow density speed studies, hydrodynamic analogies, Application of hydrodynamic analogy, Car following theory and its application to traffic engineering, probabilistic description of traffic flow, an introduction to queuing theory as applied to traffic flow problems for study state conditions, simulation studies.

UNIT III

(08 Periods)

TRANSPORT ECONOMICS: Economic evaluation of highway schemes– need for economic evaluation– cost and benefits of transportation projects– basic principles

of economic evaluation - Net present value method, benefit/cost ratio method - internal rate of return method - Vehicle operating costs - Value of travel time saving - Accident costs.

PUBLIC TRANSPORTATION – MASS TRANSIT SYSTEMS: Bus and rail transit, characteristic capacities – Introduction to advanced computational techniques for transportation planning.

UNIT IV (08 Periods)

CONSTRUCTION PLANT, MACHINERY, TOOLS AND VEHICLES USED IN TRANSPORTATION PROJECTS (HIGHWAY, RAILWAY, AIRPORT, NAVAL DOCKYARD)

: Dewatering, Blasting, Excavation, Grading, Haulage; Dredging; Concreting – RM Plant, Batching Plant, Concrete Pumps, Transit Mixers; Piling – Pile Driving equipment; Air Compressors and Pneumatic tools; Equipment for Flexible Pavements – Hot Mix Plant, Paver; Railway Track-laying equipment; Time, Cost, Output and FOL calculation; Numerical Problems

SCHEDULING AND CONTROLLING OF PLANT, MACHINERY, TOOLS AND VEHICLES: Grouping of Plant and Machinery; Incorporating in Project Planning; Preparation of Plant Schedule, Numerical Problems.

UNIT V (11 Periods)

PLANNING AND CONTROLLING OF TRANSPORTATION PROJECTS:

WBS, Network Development, Resource allocation, Planning and Controlling

INTRODUCTION TO SOFTWARE PACKAGES LIKE PRIMAVERA AND MS PROJECT

Total Periods : 45

Text Books:

1. L.R. Kadyali, *Traffic Engineering and Transportation Planning*, 7th Edition, Khanna Publications, 2012.
2. KK Chitkara, *Construction Project Management: Planning, Scheduling and Controlling*, Mc.Graw Hill Education Pvt. Ltd., 2010

REFERENCE BOOKS

1. S.P. Saxena, S.P. Arora, *Railway Engineering – A Text Book of Transportation Engineering*, 7th Edition, S. Chand and Co. Ltd., 2010
2. SP Chandola, *A Textbook of Transportation Engineering*, S Chand & Co Ltd, 2011

IV B.Tech. – I Semester
(16BT70111) ADVANCED STEEL STRUCTURES

(Program Elective - 3)

Int. Marks Ext. Marks Total Marks
 30 70 100

L T P C
 3 1 - 3

PRE-REQUISITES: Courses on Structural Analysis-I, Structural Analysis-II, Steel Structures.

COURSE DESCRIPTION: Welded plate girders; Gantry girder; Steel water tanks; Composite construction; Grillage foundation.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Gain the knowledge on advanced steel structures: welded plate girders, gantry girder, water tanks, composite construction, grillage foundation and connections.
- CO2. Analyze the advanced steel structures and their elements.
- CO3. Design advanced steel structures and their elements.
- CO4. Provide solutions to complex engineering problems associated with advanced steel construction through proper analysis and design.
- CO5. Use appropriate techniques to analyze and design of advanced steel structures and their elements.
- CO6. Ensure safety and stability in the design of advanced steel structures and their elements.
- CO7. Follow IS codes in the design of advanced steel structures and their elements.

DETAILED SYLLABUS:

UNIT-I: WELDED PLATE GIRDERS (10 Periods)

Design of cross section of plate girders, Design of end stiffeners, intermediate stiffeners, bearing stiffeners and horizontal stiffeners.

UNIT-II: GANTRY GIRDER (09 Periods)

Gantry girder impact factors, Longitudinal forces, Design of gantry girders.

UNIT-III: STEEL WATER TANKS (09 Periods)

Specifications, Design of rectangular pressed steel tank.

UNIT - IV: STEEL - CONCRETE COMPOSITE CONSTRUCTION (08 Periods)

Design principles, Shear connections, Composite beam design.

UNIT-V: GRILLAGE FOUNDATION (09 Periods)

Introduction, Design of grillage foundation, Foundation for a single column, Foundation for a two column.

Total Periods: 45

TEXT BOOKS:

1. S.S. Bhavikatti, *Design of Steel Structures*, I.K. International Publishing House Pvt. Ltd., 3rd Edition, 2010.
2. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Design of Steel Structures*, Laxmi Publications, 2nd Edition, 2013.

REFERENCE BOOKS:

1. S. Ramachandra, *Design of Steel Structures*, Dhanpat Rai Publishing Company, 2nd Edition, 2007.
2. N. Krishna Raju, *Structural Design and Drawing*, Universities Press, 3rd Edition, 2009.
3. S.K. Duggal, *Limit State Design of Steel Structures*, McGraw-Hill, 2nd Edition, 2014.
4. N. Subramanian, *Design of Steel Structures*, Oxford University Press, 2010.

CODES/TABLES:

1. IS: 800-2007: General Construction in Steel – Code of Practice, Steel Tables, **are to be permitted into the examination hall.**

IVB.Tech IISemester
14BT80103: ADVANCED STEEL STRUCTURES

(PROFESSIONAL ELECTIVE III)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Steel Structures

COURSE DESCRIPTION: Riveted plate girders and welded plate girders–Roof and Tubular trusses–Gantry Girder–steel water tanks– plastic analysis and composite construction

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

1. Explain plate girders, roof trusses and water tanks due to various loading conditions.
2. Design roof trusses, plate girders and composite construction.

DETAILED SYLLABUS:

UNIT I (10 Periods)
RIVETED PLATE GIRDERS AND WELDED PLATE GIRDERS:

RIVETED PLATE GIRDERS: Design of cross section–Curtailed moment of flange plates–connection of flange angle to web and flange angle to flange plates.

WELDED PLATE GIRDERS: Design of cross section of plate girders–Design of vertical, horizontal and bearing stiffeners.

UNIT II (09 Periods) ROOF AND TUBULAR

TRUSSES: ROOF TRUSSES: Different types of trusses–Design loads–Load combinations–

IS Code recommendations

–Structural details–Design of simple roof trusses involving the design of purlins, members and joints.

TUBULAR TRUSSES: Design of tension members, compression members and –Tubular trusses–Connections.

UNIT III (09 Periods)

GANTRY GIRDER: Gantry girder impact factors–Longitudinal forces–Design of gantry girders.

UNIT IV (09 Periods)

STEEL WATER TANKS: Specifications–Design of rectangular steel tank.

UNIT V (08 Periods)

PLASTIC ANALYSIS AND COMPOSITE CONSTRUCTION: Introduction to plastic analysis–Shape factor, plastic hinge, collapse loads for simply supported beams, propped cantilevers, and two span continuous beams – Design simple beams.

Total Periods: 45

TEXT BOOKS

1. S.K. Duggal, *Design of Steel Structures*, 2nd Edition, Tata McGraw Hill, New Delhi, 2014.
2. B.C. Punmia, *Design of Steel Structures*, 1st Edition, Laxmi publication (P) LTD, New Delhi, 2013.

REFERENCE BOOKS

1. S.S. Bhavikatti, *Design of Steel Structures*, 2nd Edition, I.K.

International Publishing House Pvt. Ltd, 2010.

2. N. Krishna Raju, *Structural Design and Drawing*, 3rd Edition, Universities Press, Hyderabad, 2009.

3. Ramachandra and Virendra Gehlot, *Design of Steel Structures*, 11th Edition, Scientific Publishers, Jodhpur, 2005.

4. N. Subramanian, *Design of Steel Structures*, 1st Edition, Oxford University Press, 2010

IS Codes: IS 800–2007, IS 875–Part III, IS 1161–1979 and Steel Tables are to be permitted into the examination hall

IV B.Tech. – I Semester
(16BT70112) EARTHQUAKE RESISTANT DESIGN
OF STRUCTURES

(Program Elective –3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Structural Dynamics, Engineering Geology.

COURSE DESCRIPTION: Earthquake engineering; Earthquake analysis; Codal design and detailing provisions; Seismic planning; Shear walls and base isolation techniques.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- | | |
|------|---|
| CO1. | Acquire the knowledge on seismology and earthquake resistant design of structures. |
| CO2. | Analyze structures for earthquake loading. |
| CO3. | Design earthquake resistant structures. |
| CO4. | Recommend suitable structural elements for earthquake resistant structures. |
| CO5. | Use an appropriate technique for earthquake resistant design of structures. |
| CO6. | Consider stability and safety issues in earthquake resistance design of structures. |
| CO7. | Ensure ethics in earthquake resistant design of structures as per IS Codes. |

DETAILED SYLLABUS:

UNIT-I: EARTHQUAKE ENGINEERING (08 Periods)

Engineering seismology, Earthquake phenomenon, Causes and effects of earthquakes, Faults, Structure of earth, Plate tectonics, Elastic rebound theory, Earthquake terminology, Source, Focus, Epicenter, Earthquake size, Magnitude and intensity of earthquakes, Classification of earthquakes, Seismic waves, Seismic zones, Seismic zoning map of India.

UNIT-II: EARTHQUAKE ANALYSIS (09 Periods)

Rigid base excitation, Formulation of equations of motion for SDOF and MDOF Systems, Earthquake response analysis of single and multi-storied buildings, Use of response spectra.

UNIT-III: CODAL DESIGN AND DETAILING PROVISIONS

(11Periods) **CodalDesignProvisions:** ReviewofthelatestIndianseismiccode IS:1893 – 2002 (Part-I): Provisions for buildings, Earthquake design philosophy – Assumptions, Design by seismic coefficient and response spectrum methods, Displacements and drift requirements, Provisions for torsion.

CodalDetailingProvisions: ReviewofthelatestIndianseismiccodes IS:4326, IS:13920 and SP-34 provisions for ductile detailing of R.C buildings – Beam, Column and joints, **Softstorey**.

UNIT – IV: SEISMIC PLANNING (08Periods)

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 – V: SHEAR WALL AND BASE ISOLATION TECHNIQUES

(09Periods) **ShearWall:** Types, Design of shear walls as per IS:13920 – Detailing of reinforcements.

Base Isolation Techniques: Basic concept of seismic base isolation, Various systems and their importance.

Total Periods: 45

TEXT BOOKS:

1. Pankaj Agarwal and Manish Shrikhande, *Earthquake Resistant Design of Structures*, Prentice Hall of India, 2006.
2. S.K. Duggal, *Earthquake Resistant Design of Structures*, Oxford University Press, 2010.

REFERENCE BOOKS:

1. Anil K. Chopra, *Dynamics of Structures*, Pearson Education, 3rd Edition, 2007.
2. Clough and Penzien, *Dynamics of Structures*, McGraw-Hill International Edition, 3rd Edition, 2008.
3. Mario Paz, *Structural Dynamics: Theory and Computation*, Kluwer Academic Publication, 2004.
4. C. V. R. Murty, *Earthquake Tips*, NICEE (www.nicee.org), IIT, Kanpur.

CODE:

IS: 1893-2002: Indian Standard Criteria for Earthquake Resistant Design of Structures, **istobepermittedintotheexaminationhall.**

IVB.TechIISemester
14BT80108: EARTHQUAKE RESISTANT DESIGN
OF STRUCTURES
(PROFESSIONAL ELECTIVE-III)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Structural Dynamics, Engineering Geology.

COURSE DESCRIPTION: Introduction to Structural Dynamics and Multi-Degree of Freedom Systems–Earthquake Analysis and Earthquake Engineering–Codal Design Provisions–Codal Detailing Provisions– Shear Walls.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

1. Explain the principles of seismic resistant design of structures.
2. Analyze structure subjected to natural vibrations and estimate frequencies.
3. Design of an earthquake resistant building using IS codes.

DETAILED SYLLABUS:

UNIT I

(10 Periods) EARTHQUAKE

ENGINEERING: Engineering seismology –Earthquake phenomenon– Causes and effects of earthquakes–Faults– Structure of earth–Plate tectonics–Elastic rebound theory–Earthquake terminology
–Source, focus, epicenter etc.–Earthquake size–Magnitude and intensity of earthquakes–Classification of earthquakes– Seismic waves– Seismic zones–Seismic zoning map of India.

UNIT II

(09 Periods) THEORY OF

VIBRATIONS: Theory of vibrations–Free vibration of single degree–Two degree and multi degree freedom systems–Vibrations absorbers–Brief introduction to instruments–Accelerograms.

UNIT III

(08 Periods)

CODAL DESIGN PROVISIONS: Review of the latest Indian seismic code IS: 1893–2002 (Part-I) provisions for buildings –Earthquake design philosophy–Assumptions–Design by seismic coefficient and response spectrum methods–Displacements and drift requirements–Provisions for torsion.

UNIT IV

(08 Periods)

CODAL DETAILING PROVISIONS: Review of the latest Indian seismic codes IS: 4326, IS: 13920 and SP-34 provisions for ductile detailing of R.C buildings–Beam, column and joints.

UNIT V

(10 Periods)

SHEAR WALLS: Types–Design of shear walls as per IS: 13920–Detailing of reinforcement.

TEXT BOOKS:

1. Pankaj Agarwal and Manish Shrikhande, *Earthquake Resistant Design of Structures*, 1st Edition, Prentice Hall of India, 2006.
2. S.K. Duggal, *Earthquake Resistant Design of Structures*, 1st Edition, Oxford University Press, 2010.

REFERENCE BOOKS

1. Clough and Penzien, *Dynamics of Structures*, 3rd Edition, Mc.Graw Hill International Edition, 2008.
2. Anil.K. Chopra, *Dynamics of Structures*, 3rd Edition, Pearson Education, 2007.
3. C.V.R. Murty, *Earthquake Tips*, NICEE, IIT, Kanpur.
4. Mario Paz, *Structural Dynamics: Theory and computation*, Kluwer Academic Publication, 2004.

Codes/Tables IS Codes: IS1893–2002, IS4326–1993 and IS13920–1993 to be permitted into the examinations hall.

IV B.Tech. – I Semester
(16BT70113) HIGHWAY CONSTRUCTION AND MAINTENANCE

(Program Elective –3)

Int. Marks	Ext. Marks	Total Marks
30	70	100

L	T	P	C
3	1	-	3

PRE-REQUISITES: Course on Highway and Traffic Engineering

COURSE DESCRIPTION: Highway construction; Stabilized roads; Highway drainage, Hill roads; Highway construction equipment; Highway maintenance; Road side development.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- | | |
|------|--|
| CO1. | Demonstrate the knowledge on highway construction and maintenance. |
| CO2. | Analyze the problems associated with highway construction and maintenance. |
| CO3. | Design highway drainage. |
| CO4. | Solve issues related to highway construction and maintenance through proper investigations and interpretation of data. |
| CO5. | Use appropriate techniques and tools in highway construction and maintenance. |
| CO6. | Consider the societal issues in highway construction and maintenance. |
| CO7. | Provide solutions to the problems in highway construction and maintenance considering environment. |
| CO8. | Follow ethics in highway construction and maintenance. |

DETAILED SYLLABUS:

UNIT-I: HIGHWAY CONSTRUCTION (08 Periods)

General construction, Earth work, Construction of fill and subgrade, Gravel roads, WBM roads, Bituminous pavements, Cement concrete pavements, Different types of joints in cement concrete pavements - Joint filler and sealer; Interlocking concrete block (ICBP) pavements.

UNIT-II: STABILIZED ROADS (08 Periods)

Introduction, Properties of soil-aggregate mixes, Mechanical soil stabilization, Soil-cement stabilization, Soil-lime stabilization, Stabilization of soil using bituminous materials and special problems in soil stabilization work.

UNIT-III: HIGHWAY DRAINAGE AND HILL ROADS (10 Periods)

Highway Drainage: Importance of highway drainage - Requirements; Surface drainage - Design of surface drainage system; Subsurface drainage, Drainage of slopes and erosion control, Road construction in waterlogged areas and black cotton soils.

Hill Roads: General considerations, Alignment of hill roads, Geometric design of hill roads, Design and construction; Drainage and maintenance problems in hill roads.

UNIT-IV: HIGHWAY CONSTRUCTION EQUIPMENT (09 Periods)

Excavators-Drilling rock and earth; Aggregate production-Trucks and haulage equipment, Dozers, Scrappers; Finishing equipment, Hot-mix plants for bituminous mixes, Pavers and compacting equipment for hot bituminous mixes, Plants and equipment for cement concrete and paving equipment; Piles and pile driving equipment, Air compressors and pumps.

UNIT-V: HIGHWAY MAINTENANCE AND ROAD SIDE DEVELOPMENT

(10 Periods) Highway Maintenance: Introduction, Pavement failures, Maintenance of highways; Pavement evaluation, Strengthening of existing pavements by overlays.

Road Side Development: Environment factors in planning and development of highways, Road side development and arboriculture, Planning plantation of trees, Species and their selection, Care of trees.

Total Periods: 45

TEXT BOOKS:

1. Khanna, S. K., Justo, C. E. G. and Veeraragavan, A., *Highway Engineering*, Nem Chand & Bros, Roorkee, Revised 10th Edition, 2014.
2. Kadiyali, L. R., *Traffic Engineering and Transport Planning*, Khanna Technical Publications, 7th Edition, 2010.

REFERENCE BOOKS:

1. Subhash C. Saxena, *A Course in Traffic Planning and Design*, Dhanpat Rai Publications, 2nd Edition, 1989.
2. Jotin Khisty, C. and Kent Lall, B., *Transportation Engineering – An Introduction*, Prentice Hall of India Pvt. Ltd., 3rd Edition, 2006.
3. Partha Chakroborthy and Animesh Das, *Principles of Transportation Engineering*, Prentice Hall of India Pvt. Ltd., 2005.
4. Papacostas, C. S. and Prevedouros, P. D., *Transportation Engineering and Planning*, Prentice Hall of India Pvt. Ltd., 2006.

IIIB.TechIISemester

14BT60103:TRANSPORTATION ENGINEERING-I

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Surveying, Soil Mechanics

COURSE DESCRIPTION: Highway development and planning– Highway geometric design– Highway alignment and Highway drainage
– Pavement types and Design– Highway construction and equipment– Railway Engineering, Tracks, Curves, Alignment – Airport Engineering, Runway & Lighting systems

COURSE OUTCOMES:

After the completion of this course, a successful student will be able to:

1. Understand the methodology of various tests on Highway materials and their significance
2. Assemble, analyze, and appropriately apply transportation engineering data from existing graphics, reports, and other documents
3. Design Highway Geometrics, Flexible and Rigid Pavements, Transportation systems and components

DETAILED SYLLABUS:

UNIT I

(08 Periods)

HIGHWAY DEVELOPMENT AND PLANNING: Highway development in India– Necessity for highway planning – Different road development plans– Classification of roads – Road network patterns – Highway alignment– Factors affecting alignment– Engineering surveys– Drawings and reports.

HIGHWAY GEOMETRIC DESIGN: Importance of geometric design– Design controls and criteria– Highway cross section elements– sight distance elements– Stopping sight distance, overtaking sight distance and intermediate sight distance– Design of horizontal alignment– Design of superelevation and extra widening – Design of transition curves– Design of vertical alignment– Gradients – Vertical curves.– Numerical problems on all the above topics

UNIT II

(07 Periods)

HIGHWAY MATERIALS: Aggregates and bitumen– Desirable properties – Laboratory tests on aggregate and bitumen, CBR test– Specifications – Aggregate bitumen mixes– Desirable properties– Mix design by Marshall method– Cement and cement concrete– Numerical Problems on all these methods of Testing

HIGHWAY DRAINAGE: Importance of highway drainage– Requirements – Surface drainage – Subsurface drainage – Drainage of slopes and erosion control – Road construction in water logged areas and black cotton soils– Numerical problems

UNIT III

(12 Periods)

PAVEMENT DESIGN: Types of pavements Difference between flexible and rigid pavements – Pavement components – Subgrade, subbase, base and wearing course– Functions of pavement components– Design factors– Flexible pavement design methods– G. I method, CBR method, Triaxial method – Numerical examples – Design of rigid pavements – Critical load positions– Westergaard's stress equations– Computing radius

of relative stiffness and equivalent radius of resisting section – Stresses in rigid pavements – Design of expansion and contraction joints in CC pavements. Design of dowel bars and tie bars – Numerical Problems in all above methods using Formulae and Charts.

UNIT IV

(09 Periods)

HIGHWAY CONSTRUCTION: Earthwork – Construction of WBM Roads

– Bituminous Pavements – Cement Concrete Pavements – Joints in Cement Concrete Pavements – RCC and PCC Pavements

HIGHWAY CONSTRUCTION AND CONSTRUCTION EQUIPMENT: Excavators – Drilling Rock and Earth – Aggregate Production – Trucks and Haulage Equipment – Dozers – Scrappers – Finishing Equipment – Asphalt Mix Production and Placement – Concrete and Concrete Equipment – Piles and Pile Driving Equipment – Air Compressors and Pumps – Numerical Problems on output calculations

UNIT V

(09 Periods)

RAILWAY ENGINEERING: Permanent way components – Cross section of permanent way – Functions of various components like rails, sleepers and ballast – Rail fastenings – Creep of rails – Theories related to creep – Adzing of sleepers – Sleeper density.

GEOMETRIC DESIGN OF RAILWAY TRACK: Gradients – Grade compensation – Cant and negative superelevation – Cant deficiency – Degree of curve – Crossings and turnout.

AIRPORT ENGINEERING: Factors affecting selection of site for airport – Aircraft characteristics – Geometric design of runway – Computation of runway length – Correction for runway length – Orientation of runway – Wind rose diagram – Runway lighting system.

Total Periods: 45

TEXTBOOKS

1. S.K. Khanna and C.E.G. Justo, *Highway Engineering*, 10th Edition, Nemchand and Brothers, 2014.
2. S.P. Saxena, S.P. Arora, *Railway Engineering – A Text Book of Transportation Engineering*, 7th Edition, S. Chand and Co. Ltd., 2010.

REFERENCE BOOKS

1. S.K. Khanna and Arora, *Airport Planning and Design*, 6th Edition, Nemchand and Brothers, 2012.
2. K.K. Chitkara, *Construction Project Management: Planning, Scheduling and Controlling*, Tata McGraw Hill Education Pvt. Ltd., 2010
3. L.R. Kadyali, *Traffic Engineering and Transportation Planning*, 7th Edition, Khanna Publications, 2012.
4. SP Chandola, *A Textbook of Transportation Engineering*, S. Chand & Co Ltd, 2011.

IV B.Tech - I Semester (16BT70114) INDUSTRIAL WASTEWATER TREATMENT

(Professional Elective – 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on Wastewater Technology.

COURSE DESCRIPTION: Industrial wastewater sources and characteristics; Principles of Primary and biological treatment; Advanced wastewater treatment systems; Typical wastewater treatment systems for different industries; Waste minimization.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CEO1. Demonstrate the knowledge on characteristics of industrial wastewater, treatment systems and waste minimization.
- CEO2. Analyze characteristics, treatment systems and waste minimization techniques of industrial wastewater.
- CEO3. Design wastewater treatment systems.
- CEO4. Provide solutions to the industrial wastewater problems by proper investigations and interpretation of data.
- CEO5. Use appropriate techniques in the analysis, treatment and minimization of industrial wastewater.
- CEO6. Provide solutions for industrial wastewater problems considering society in the context of health and safety.
- CEO7. Consider environmental sustainability in solving industrial wastewater problems.
- CEO8. Follow standards in the analysis, treatment and minimization of industrial wastewater.

DETAILED SYLLABUS:

UNIT-I: CHARACTERISTICS OF INDUSTRIAL WASTEWATER (08 Periods)

Industrial sources of wastewater and characterization, Significance and determination of characteristics for different industrial effluents, Pattern of pollution and self-purification of a stream, ISI tolerance limits for disposal of effluent into inland surface water and public sewers.

UNIT-II: PRIMARY AND BIOLOGICAL TREATMENT

(10 Periods)

Scope, Working principle and functions - Equalization, Neutralization, Screen chamber, Grit chamber, Primary sedimentation tank; Microbiological metabolism - Basic kinetic equations, Biological treatment kinetics, Growth kinetics; Complete mix and plug flow systems, Oxygen requirement in aerobic process, Design of conventional treatment facilities.

biological

UNIT-III: ADVANCED TREATMENT SYSTEMS

(08 Periods)

Pollution characteristics, Toxic chemicals, Treatments - Oxidation and reduction systems, Thermal

reduction, Air stripping, Membrane systems; Nitrogen removal by biological nitrification and denitrification, Phosphate removal by activated sludge process and anaerobic filters.

UNIT-IV: TYPICAL INDUSTRIAL WASTEWATER TREATMENT (10 Periods)

Origin, Characteristics and treatment of wastewater- Pulp and paper mills, Breweries, Wineries, Distilleries, Tanneries, Textile mills, Sugar mills, Refineries and dairy units.

UNIT-V: WASTE MINIMIZATION (09 Periods)

In-plant survey, Flow measurement, Composition of wastewater generated, Analytical methods recommended for characterization, Waste volume and strength reduction, Water conservation, Factors encouraging waste minimization, Clean-up and cleaner technologies, Remediation, Hierarchy of waste management options.

Total Periods: 45

TEXTBOOKS:

1. M.N. Rao and A.K. Dutta, *Waste Water Treatment*, Oxford and IBH Publishers, 3rd Edition, 2009.
2. Met Calf and Eddy, *Wastewater Engineering, Treatment and ReUse*,

Mc.Graw Hill Education Private Limited, 4th Edition, 2010.

REFERENCE BOOKS:

1. Newmerow, *Liquid Waste of Industry*, Pearson Education Publishing Co., 1971.
2. Mark J. Hammer and Mark J. Hammer Jr., *Water and Wastewater Technology*, 6th Edition, 2008.
3. A. D. Patwardhan, *Industrial Wastewater Treatment*, PHI Publisher, 2008.
4. Rakesh Kumar and R. N. Singh, *Municipal Water and Wastewater Treatment*, TERI, 2009.

IVB.Tech IISemester
14BT80106: INDUSTRIAL WASTEWATER TREATMENT
(PROFESSIONAL ELECTIVE –III)

Internal Marks	External Marks	Total	L	T	P	C
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30	70	100	3	1	-	3
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PREREQUISITES: Wastewater Technology

COURSE DESCRIPTION: Introduction to waste water treatment – Principles of Biological treatment – Studies in Biological Wastewater treatment design – Industrial Wastewater treatment – Treatment of Liquid Wastes.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

1. Apply the principles of science in the treatment of water.
2. Analyse various pollutants present in industrial wastewater.
3. Develop solutions for the treatment of industrial wastewater and safe disposal of industrial waste.

DETAILED SYLLABUS:

UNIT I

(10 Periods) INTRODUCTION

TOWASTE WATER TREATMENT: Characteristics of Waste Water – Characteristics of Treatment Plant Effluents – Self Purification – DO – pH Values of wastes and recycling water – Toxic Substances – Primary Treatment of Wastewater.

UNIT II

(09 Periods)

PRINCIPLES OF BIOLOGICAL TREATMENT: Microbiological Metabolism – Basic Kinetic Equations – Continuous flow treatment models – Oxygen Requirement in Aerobic Process – Design of Conventional Biological Treatment Facilities.

UNIT III

(09 Periods) STUDIES IN

BIOLOGICAL WASTEWATER TREATMENT DESIGN: Introduction – Aerobic Treatment – Anaerobic Treatment – Nitrogen Removal by Biological Nitrification and Denitrification – Anaerobic Filters – U-Tube Aeration System.

UNIT IV

(08 Periods)

INDUSTRIAL WASTEWATER TREATMENT: Introduction – Characteristics – Treatment – Pulp and Paper mill Wastes – Manufacturing – Characteristics and Treatment.

UNIT V

(09 Periods)

TREATMENT OF LIQUID WASTES: Breweries, Wineries and Distilleries Waste – Tannery waste – Textile Mill Waste – Sugar Mill Waste.

Total Periods: 45

TEXTBOOKS

1. M.N. Rao and Dutta, *Waste Water Treatment*, Oxford and IBH Publishers, 3rd Edition, 2009.
2. Metcalf and Eddy, *Wastewater Engineering, Treatment and Re Use*, Mc. Graw Hill Education Private Limited, 4th Edition, 2010.

REFERENCE BOOKS

1. Newmerow, *Liquid Waste of Industry*, Pearson Education Publishing Co., 1971.
2. Mark J. Hammer and Mark J. Hammer Jr., *Water and Waste Water technology*, 6th Edition, 2008.

3. A.D.Patwardhan, Industrial Waste Water Treatment, PHI Publisher, 2008.
4. Rakesh Kumar; R.N.Singh, Municipal Water and Waste Water Treatment, TERI, 2009.

IV B.Tech. - I Semester (16BT70118) AIR POLLUTION AND CONTROL

(Program Elective - 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Environmental Studies

COURSE DESCRIPTION: Fundamentals of air pollution; Effects of air pollution; Sampling and analysis; Control methods and equipment; Air and noise pollution from industrial operations.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Demonstrate the knowledge on air pollution, effects, sampling, control methods and equipment.
- CO2. Identify and analyse air pollution and control measures.
- CO3. Design various air pollution controlling systems.
- CO4. Provide solutions to complex air pollution problems through proper investigations and interpretation.
- CO5. Use appropriate techniques in the analysis, control and management of air pollution.
- CO6. Consider the ill effects of air pollution on human health, materials and vegetation in designing controlling systems.
- CO7. Understand and demonstrate the need for sustainable development.
- CO8. Follow IS codes in analysis and control of air pollution.

DETAILED SYLLABUS:

UNIT-I: AIR POLLUTION (08 Periods)

Scope and significance of air pollution, Episodes in India and other nations

- Overview; Sources and classification of air pollutants, Meteorology and air pollution-Plume behaviour, Wind rose; Dispersion theories and model, Stack height.

UNIT-II: EFFECTS OF AIR POLLUTION (09 Periods)

Effects of air pollution on human health, animals and plants; Global effects of air pollution - Greenhouse effect, Heat islands, Acid rains, Ozone holes; Economic effects of air pollution - Material damage; Art treasures in India and other countries.

UNIT-III: SAMPLING AND ANALYSIS (09 Periods)

Classification, Stages and methods of sampling, Difficulties encountered, Instruments of sampling, Duration and location of sampling sites, Sampling - High volume filtration, Stack sampling techniques; Recent trends in sampling of stack effluents.

UNIT-IV: CONTROL METHODS AND EQUIPMENT (10 Periods)

Analytical methods - Chemical, Instrumental and biological methods; Types of collection equipment - Settling chambers, Inertial separators, Cyclones, Filters and electrostatic precipitators, Scrubbers or wet collectors; Choice of equipment and economical aspects, Control of smoke, Gaseous contaminants, Odours and byproduct changes.

UNIT-V: AIR AND NOISE POLLUTION FROM INDUSTRIAL OPERATIONS (09 Periods)

Air Pollution from Industrial Operations: Air pollution from major industrial operations – Mineral product industries, Cement industry, Petroleum refineries, Ferrous and non-ferrous metallurgical operations, Thermal power plants; Kind of air quality standards, Emission standards and air pollution indices.

Noise Pollution from Industrial Operations: Noise pollution from industrial operations, Noise standards.

Total Periods: 45

TEXTBOOKS:

1. M.N. Rao and H.V.N. Rao, *Air Pollution*, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 19th Edition, 2010.
2. Thod Godish, *Air Quality*, Levis Publishers, Taylor and Francis Group, New Delhi, 4th Edition, 2003.
3. K. Wark and C.F. Warner, Harper and Row, *Air Pollution: Its Origin and Control*, Addison-Wesley, New York, 3rd Edition, 1998.

REFERENCE BOOKS:

1. R.K. Trivedy and P.K. Goel, *An introduction to Air Pollution*, B. S. P. Books Pvt. Ltd., Hyderabad, 2nd Edition, 2005.
2. K.V.S.G. Murali Krishna, *Air Pollution and Control*, Kousal and Co. Publications, New Delhi, 3rd Edition, 2008.
3. B. Padmanabha Murthy, *Environmental Meteorology*, I.K. Internationals Pvt. Ltd., New Delhi, 2009.
4. Crawford, M., *Air pollution Control Theory*, Tata McGraw-Hill, New Delhi, 1980.
5. H.C. Perkins, *Air Pollution*, McGraw-Hill Higher Education, Lincoln, United Kingdom, 1974.

IV B.Tech. – I Semester

(16BT70120) GROUND IMPROVEMENT TECHNIQUES

(Program Elective –4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Courses on Soil Mechanics and Foundation Engineering.

COURSE DESCRIPTION: Scope of ground improvement; Methods of ground improvement; Drainage and dewatering; In-situ densification; Stabilization; Geosynthetics and earth reinforcement.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Explain the concept and techniques of ground improvement.
- CO2. Compare different types of ground improvement techniques and select an appropriate one.
- CO3. Design ground improvement techniques.
- CO4. Solve complex soil problems through suitable ground improvement techniques.
- CO5. Use and develop appropriate ground improvement techniques.
- CO6. Understand the importance of safety in the design and execution of any ground improvement technique.
- CO7. Recommend environmental friendly ground improvement techniques.
- CO8. Follow IS Codes in practicing ground improvement techniques.

DETAILED SYLLABUS:

UNIT-I: GROUND IMPROVEMENT

(08 Periods)

Role of ground improvement in foundation engineering, Methods of ground improvement, Geotechnical problems in alluvial, laterite and black cotton soils; Selection of suitable ground improvement techniques based on soil condition.

UNIT-II: DRAINAGE AND DEWATERING

(09 Periods)

Drainage techniques, Well points, Vacuum and electroosmotic methods, Dewatering after construction, Control of surface water, Well pointing in deep excavation, Drainage on slopes, Electrokinetic dewatering system.

UNIT-III: IN-SITU DENSIFICATION OF GRANULAR SOILS AND COHESIVE SOILS

(10 Periods)

Granular Soils: Principles of in-situ densification, In-situ densification methods – Dynamic compaction, Blasting, Vibrocompaction, Granular piles, Relative merits and their limitations.

Cohesive Soils: Principles of in-situ densification, In-situ densification methods – Vertical drains, Sandwick, Geodrains, Stone columns, Granular pile anchors, Lime columns and thermal methods, Relative merits and their limitations.

UNIT-IV: SOIL STABILIZATION

(09 Periods)

Soil Stabilization – Mechanical, Bitumen, Cement, Lime and Chemical; Stabilization of expansive soils; Soil stabilization by grouting – Types of grouts, Grouting equipment and machinery, Injection methods, Grout monitoring; Shotcreting and gunite technology.

UNIT-V: GEOSYNTHETICS AND EARTH REINFORCEMENT

(09 Periods) Concept of reinforcement, Types of reinforcement material, Components and applications of reinforced earth, Soil nailing, Geosynthetics – Types, Functions, Applications; Design of geosynthetic reinforced earth walls.

Total Periods: 45

TEXTBOOKS:

1. Hausmann, M. R., *Engineering Principles of Ground Modification*, McGraw-Hill Publishers, 1990.
2. Purushotham Raj, P., *Ground Improvement Techniques*, Laxmi Publications Pvt. Ltd., 2005.

REFERENCE BOOKS:

1. Moseley, M. P. and Kirsch, K., *Ground Improvement*, Taylor Francis Ltd., 2nd Revised Edition, 2004.
2. Xanthakos P. P., Abramson, L. W. and Bruce, D. A., *Ground Control and Improvement*, John Wiley and Sons, 1994.
3. Koerner, R. M., *Designing with Geosynthetics*, Xlibris Publishers, 6th Edition, 2012.
4. Jewell, R. A., *Soil Reinforcement with Geotextiles (Report)*, CIRIA Special Publication, 1996.

IVB.TechIISemester
14BT80110:GROUNDIMPROVEMENT TECHNIQUES
[PROFESSIONAL ELECTIVE –IV]

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: SoilMechanicsandFoundationEngineering

COURSE DESCRIPTION: Scope ofground improvement; Methods of groundimprovement–Drainageanddewatering– In-situtreatment ofcohesionless andcohesivesoils–Stabilisation –Earthreinforcement

COURSEOUTCOMES:

Aftercompletionofthecourse,asuccessfulstudentwillbeableto:

1. Explainvariousmethodsavailableforgroundimprovement
2. Usebothmechanicalandchemicalmethods/geosynthetics forimprovement ofsoils.

DETAILED SYLLABUS:

UNIT I

(08 Periods)

GROUNDIMPROVEMENT

Roleofground improvement infoundation engineering –methods of ground improvement –Geotechnical problems inalluvial, laterite and blackcottonsoils– Selectionofsuitablegroundimprovementtechniques basedonsoilcondition.

UNIT II

(09Periods)

DRAINAGEANDDEWATERING

Drainagetechniques–Wellpoints–Vaccumandelectroosmoticmethods –Seepageanalysisfortwodimensionalflow–fullyand partiallypenetrating slotsinhomogenous deposits[Simplecasesonly].

UNIT III

(10Periods)

INSITU DENSIFICATION

Granularsoils:PrinciplesofInsituDensification–InsituDensification Methods–DynamicCompaction,Blasting,Vibrocompaction,GranularPilees –RelativeMeritsandtheir Limitations

Cohesivesoils:PrinciplesofInsituDensification– InsituDensification Methods– verticaldriains,sandwich,geodrains,stoneandlimecoloms andthermalmethods– RelativeMeritsand TheirLimitations.

**UNIT IV
STABILISATION**

(09 Periods)

Types of grouts – Grouting equipment and machinery – Injection methods
– Grout monitoring – Shotcreting and Guniting Technology – Stabilisation with mechanical
bituminous cement, lime and chemicals – Stabilisation of expansive soils.

**UNIT V
GEOSYNTHETICS AND EARTH REINFORCEMENT**

(09 Periods)

Concept of reinforcement – Types of reinforcement material – Applications of reinforced earth –
Types of Geosynthetics – Functions and applications of Geosynthetics.

(Total 45 Periods) TEXTBOOKS

1. Hausmann M.R., *Engineering Principles of Ground Modification*, International Edition, Mc.Graw Hill, 1990.
2. Purushotham Raj, P., *Ground Improvement Techniques*, 1st Edition, Laxmi Publications [P] Ltd., 2005.

REFERENCE BOOKS

1. Moseley, M.P. and Kirsch, K., *Ground Improvement*, 2nd Revised Edition, Taylor Francis Ltd, 2004.
2. Xanthakos P.P., Abramson, L. and Bruce, D.A., *Ground Control and Improvement*, 1st Edition, John Wiley and Sons, 1994.
3. Koerner, R.M., *Designing with Geosynthetics*, 6th Edition, Prentice Hall Inc., 2012.
4. Jewell, R.A., *Soil Reinforcement with Geotextiles [Report]*, CIRIA Special Publication, 1996.

IV B.Tech. – I Semester

(16BT70121) HYDROPOWER ENGINEERING

(Program Elective –4)

Int.Marks	Ext.Marks	TotalMarks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Fluid Mechanics and Hydraulic Machinery.
DESCRIPTION: Hydro power; Water power estimate; Hydro powerplants; Pumped storage powerplants; Hydraulic turbines; Water conveyance; Channel surges and intakes; Powerhouse and equipment. **COURSE**

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Demonstrate knowledge on the basic concepts of hydropower, hydropower plants and its components.
- CO2. Analyze hydropower estimates, hydropower plants and its components.
- CO3. Design components of hydropower plant.
- CO4. Recommend suitable solutions for hydropower issues through proper investigation and interpretation.
- CO5. Use appropriate methods in estimation of hydropower potential.
- CO6. Consider societal issues while recommending for the construction of hydropower plants.
- CO7. Ensure environmental sustainability in planning, construction and operation of hydropower plants.

DETAILED SYLLABUS:

UNIT-I: HYDROPOWER AND ESTIMATE (09 Periods)

Hydropower development, Sources of energy, Estimation of water power potential, Load curve, Load factor, Capacity factor, Utilization factor, Diversity factor, Load duration curve, Firm power, Secondary power, Prediction of load, Collection and analysis of stream flow data, Mass curve, Flow duration curves, Construction and utility of these curves, Effect of storage and pondage, Estimates of available water power.

UNIT-II: HYDROPOWER PLANTS (09 Periods)

Low and high head plants: Classification of hydro plants, Run-off-river plants, General arrangement of run-off-river plants, Valley dam plants, Diversion canal plants, High head diversion plants, Storage and pondage, Basic features, Advantages of pumped storage plants, Types of pumped storage plants, Relative merit of two-unit and three-unit arrangement, Tidal power plants.

UNIT-III: HYDRAULIC MACHINES (10 Periods)

Reciprocating Pumps, Components and working principle of single acting and double acting reciprocating pumps, Discharge coefficient, Volumetric efficiency and Slip; Work done by reciprocating pumps, Work done and power input, Indicator diagram, Effect of acceleration and friction on indicator diagram.

UNIT-IV: WATER CONVEYANCE (09 Periods)

Classification of penstocks, Design criteria, Economical diameter, Anchor blocks, Conduit valves, Bends and manifolds- Water hammer, Resonance in penstocks, Channel surges, Surge tanks, Intakes, Types, Losses, Air entrainment, Inlet aeration, Canals, Forebay, Tunnels, Selection of turbines.

UNIT-V: POWERHOUSE AND EQUIPMENT (08 Periods)

Location of powerhouse, General arrangement of hydroelectric unit, Number and size of units, Powerhouse substructure.

Total Periods: 45

TEXTBOOKS:

1. M.M.Dandekar and K.N.Sharma, *Water Power Engineering*, Vikas Publishing House Pvt.Ltd., India, 2007
2. R.K.Sharma and T.K.Sharma, *A Text Book of Water Power Engineering*, S.Chand Company, New Delhi, 2008.

REFERENCE BOOKS:

1. B.C.Punmia, B.B.Pandey, Ashok Kumar Jain and Arun Kumar Jain, *Irrigation and Water Power Engineering*, Laxmi Publications, New Delhi, 2009.
2. P.N.Modi, *Irrigation Water Resources and Water Power Engineering*, Standard Book House, 7th Edition, 2008.
3. K. R. Arora, *Irrigation, Water Power and Water Resources Engineering*, Standard Publishers Distributors, Delhi, 4th Edition, 2011.
4. Deshmukh M.M, *Water Power Engineering*, Dhanpat Rai and Sons, New Delhi, 1978.

IV B.Tech. – I Semester
(16BT70122) PAVEMENT ANALYSIS AND DESIGN
 (Program Elective –4)

Int.Marks	Ext.Marks	TotalMarks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Highway and Traffic Engineering.

COURSE DESCRIPTION: Highway materials and mix design; Design factors for flexible pavements; Analysis and design of flexible pavements; Analysis and design of rigid pavements.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Demonstrate the knowledge on transportation planning, pavement analysis and design.
- CO2. Analyze problems associated with transportation planning, pavement analysis and design.
- CO3. Design of pavements and bituminous concrete mix.
- CO4. Solve transportation planning, pavement analysis and design problems through proper analysis, interpretation and design.
- CO5. Use appropriate methods in transportation planning, pavement analysis and design.
- CO6. Consider safety issues in providing solutions to problems in transportation planning and pavement design.
- CO7. Provide solutions to the problems in transportation planning, pavement analysis and design, considering environment.
- CO8. Follow codes of practice in transportation planning, pavement analysis and design.

DETAILED SYLLABUS:

UNIT-I: HIGHWAY MATERIALS AND MIX DESIGN (09 Periods)

Soil, Aggregate and bitumen, Aggregate properties and their Importance, Bituminous concrete-Mix design, Marshall's method of bituminous mix design.

UNIT - II: DESIGN FACTORS AND ANALYSIS OF FLEXIBLE PAVEMENTS

(12 Periods) Design Factors for Flexible Pavements: Types of pavement, Factors affecting design of flexible pavements - Elastic modulus, Poisson's ratio, Wheel load, Wheel configuration and tyre pressure, ESWL Concept, Contact pressure, Material characteristics, Environmental and other factors.

Analysis of Flexible Pavements: Stresses in flexible pavement, Layered systems concept - One layer system, Boussinesq two-layer system, Burmister two-layer theory for pavement design.

UNIT-III: DESIGN OF FLEXIBLE PAVEMENTS (08 Periods)

Theoretical, Empirical and semi-empirical methods - Burmister, CBR Method, AASHO Method, IRC method.

UNIT-IV: ANALYSIS OF RIGID PAVEMENTS (08 Periods)

Stresses in rigid pavements, Relative stiffness of slab, Modulus of subgrade reaction, Stresses due to warping, Stresses due to loads, Stresses due to friction.

UNIT-IV:DESIGN OF RIGID PAVEMENTS**(08 Periods)**

General design approach, PCA method, AASHTO, IRC method, Design of different types of joints in CC pavements, Design of tie bars and dowel bars.

Total Periods: 45**TEXTBOOKS:**

1. Khanna, S.K., Justo, C.E.G. and Veeraragavan, A., *Highway Engineering*, Nem Chand & Bros, Roorkee, Revised 10th Edition, 2014.
2. Kadiyali, L. R., *Traffic Engineering and Transport Planning*, Khanna Technical Publications, 7th Edition, 2010.

REFERENCE BOOKS:

1. Jotin Khisty, C. and Kent Lall, B., *Transportation Engineering – An Introduction*, Prentice Hall of India Pvt. Ltd., 3rd Edition, 2006.
2. Partha Chakroborthy and Animesh Das, *Principles of Transportation Engineering*, Prentice Hall of India Pvt. Ltd, 2005.
3. Yoder, E. J. and Witczack, M. W., *Principles of Pavement Design*, John Wiley & Sons, New York, 2nd Edition, 1975.
4. Papacostas, C. S. and Prevedouros, P. D., *Transportation Engineering and Planning*, Prentice Hall of India Pvt. Ltd., 2006.
5. Mannering, F.L. and Washburn, S.S., *Principles of Highway Engineering and Traffic Analysis*, John Wiley & Sons, Inc., 5th Edition, 2013.

CODES:

1. IRC:37-2012: *Tentative Guidelines for the Design of Flexible Pavements*, Third Revision, Indian Roads Congress, New Delhi,
2. IRC:58-2015: *Guidelines for the Design of Plain Jointed Rigid Pavements for Highways*, Fourth Revision, Indian Roads Congress, New Delhi, **are to be permitted into the examination hall.**

IV B.Tech. – I Semester (16BT70123) PRESTRESSED CONCRETE

(Program Elective –4)

Int.Marks	Ext.Marks	TotalMarks
30	70	100

L	T	P	C
3	1	-	3

PRE-REQUISITES: Courses on Structural Analysis, Reinforced Concrete Structures. Cement

COURSE DESCRIPTION: Materials for prestressed concrete; Prestressing systems; Analysis of prestress; Design of section for flexure and shear; Analysis of end blocks, Composite construction of prestressed and in situ concrete.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on prestressed concrete structures and composite construction.

CO2. Analyze prestressed concrete members and composite structures.

CO3. Design prestressed concrete structural elements and composite structures.

CO4. Solve problems associated with prestressed concrete structures and composite construction through proper analysis and interpretation.

CO5. Use appropriate techniques for the analysis and design of prestressed concrete structures and composite construction.

CO6. Consider safety issues in the design of prestressed concrete structures and composite construction in the context of society.

CO7. Follow IS Codes of practice in the design of prestressed concrete structures and composite construction.

DETAILED SYLLABUS:

UNIT-I: MATERIALS FOR PRESTRESSED CONCRETE AND PRESTRESSING SYSTEMS

(08 Periods)

Principles of prestressing, Types of prestressing, Materials- High strength concrete, High tensile steel; Advantages and limitations of pre-stressed concrete, Tensioning devices, Pre-tensioning and post-tensioning systems, Types- Hoyer system, Magnel Blaton system, Freyssinet system, Gifford-Udall system, Lee McCalls system.

UNIT-II: ANALYSIS OF PRESTRESS

(10 Periods)

Analysis of sections for flexure- Stress concept, Load balancing concept, Force concept; Kern zone, Pressure line, Cable zone,

Losses of prestress in pre-tensioning and post-tensioning system.

UNIT - III: DESIGN OF SECTION FOR FLEXURE AND SHEAR

(08 Periods) Design of section for the limit state of collapse in flexure, Stress range approach, Design of shear reinforcements - IS codal provision.

UNIT-IV: ANALYSIS OF END BLOCKS

(10 Periods)

Anchorage zone stresses - Guyon's method, Magnel method; Anchorage zone reinforcement, Transfer of prestress pre-tensioned members.

UNIT-V: COMPOSITE CONSTRUCTION OF PRESTRESSED

AND INSITU CONCRETE**(09 Periods)**

Need of composite construction, Different types – Propped, Unpropped; Stress distribution of composite construction, Differential shrinkage, Design of composite section.

Total Periods: 45**TEXT BOOKS:**

1. N. Krishna Raju, *Prestressed Concrete*, Tata McGraw-Hill Publications, 4th Edition, 2011.
2. N. Rajagopalan, *Prestressed Concrete*, Narosa Publications, 2nd Edition, 2014.

REFERENCE BOOKS:

1. Ramamrutham, *Prestressed Concrete*, Dhanpat Rai Publications, 5th Edition, 2003.
2. T. Y. Lin and Ned H. Burns, *Design of Prestressed Concrete Structures*, John Wiley and Sons, 3rd Edition, 2010.
3. Praveen Nagaraju, *Prestressed Concrete Design*, Dorling Kindersley Publication, 2013.
4. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Reinforced Concrete Structures*, Vol. I, Laxmi Publications Pvt. Ltd., New Delhi, 19th Edition, 2010.

CODE:

IS:1343-2012: Prestressed Concrete – Code of Practice, **isto be permitted into the examination hall.**

IVB.TechIISemester

14BT80101:PRESTRESSED CONCRETE

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Structural Analysis, Reinforced Concrete constructions

COURSE DESCRIPTION: Introduction to prestressing, methods and materials – Analysis of sections for flexure – Design of section for flexure and shear – Analysis of end blocks – Deflection of prestressed concrete sections

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

1. Demonstrate knowledge on the preparation of prestressed concrete and members
2. Analyze prestressed members under flexure and shear.
3. Design the prestressed members using elastic design method.

DETAILED SYLLABUS:

UNIT I

(08 Periods)

INTRODUCTION: Introduction to prestressing – Materials – Types of prestressing – Loss of prestress – Methods of Pretensioning and post tensioning

UNIT II

(10 Periods)

ANALYSIS OF SECTIONS FOR FLEXURE: Analysis of sections for flexure – Prestressed with straight, concentric, eccentric tendons, bent and parabolic tendons.

UNIT III

(09 Periods) DESIGN OF

SECTIONS FOR FLEXURE AND SHEAR: Kern Zone, cable zone – Allowable stresses – Design criteria as per I.S. Code – Design of section for flexure and shear.

UNIT IV

(10 Periods)

ANALYSIS OF ENDBLOCKS: Anchorage zone stresses: Guyon's method and Mugnel method – Anchorage zone reinforcement – Transfer of prestress pre-tensioned members.

UNIT V

(08 Periods) DEFLECTION

OF PRESTRESSED CONCRETE BEAMS: Importance of control of deflections – Factors influencing deflections – Short term deflections of uncracked members – Prediction of long term deflections.

Total Periods: 45

TEXTBOOKS

1. N. Krishna Raju, *Prestressed Concrete*, 4th Edition, Tata McGraw-Hill Publications, New Delhi, 2011.
2. N. Rajagopalan, *Prestressed Concrete*, 2nd Edition, Narosa Publications, New Delhi, 2014.

REFERENCE BOOKS

1. Ramamrutham, *Prestressed Concrete*, 5th Edition, Dhanpat Rai Publications, New Delhi, 2003.
2. T.Y. Lin and Ned H. Burns, *Design of Prestressed Concrete Structures*, 3rd Edition, John Wiley and Sons, 2010.

3. Praveen Nagaraju, *Prestressed Concrete Design*, Dorling Kindersley Publication, 2013.
4. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Reinforced Concrete Structures– Vol.I*, 19th Edition, Laxmi Publications Pvt. Ltd., New Delhi, 2010.

IV B.Tech. – I Semester
(16BT70131) CIVIL ENGINEERING SOFTWARE LAB

Int.Marks	Ext.Marks	TotalMarks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses in different domains of Civil Engineering.

COURSE DESCRIPTION: Software tools in modeling; analysis and design of systems in different domains of Civil Engineering
 - Structural Engineering; Geotechnical Engineering; Transportation Engineering; Environmental Engineering; Water Resources Engineering; Construction Engineering; Surveying.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Acquire knowledge on software tools in analysis and design of civil engineering systems.
- CO2. Analyse civil engineering systems by software tools.
- CO3. Design civil engineering systems through software tools.
- CO4. Address complex civil engineering problems for better solutions with software tools.
- CO5. Use the latest software tools for modeling, analysis and design of civil engineering systems.
- CO6. Consider safety of built environment through software tools.
- CO7. Contemplate environmental sustainability of civil engineering systems through software tools.
- CO8. Follow ethics in civil engineering practice through software tools.
- CO9. Function effectively as an individual and as a team member in modeling, analysis and design of civil engineering systems using software tools.
- CO10. Communicate effectively on civil engineering software applications in written, oral and graphical forms.

DETAILED SYLLABUS:

This laboratory provides training to the students in using popular softwares for various Civil Engineering Applications as mentioned below.

LIST OF EXERCISES:

1. **ROBOT Structure** for Structural Analysis and Design
2. **SAP2000** for Structural Analysis and Design
3. **ETABS** for Integrated Analysis, Design and Drafting of Building Systems
4. **NISA-CIVIL** for Structural Analysis and Design
5. **PLAXIS 2D/3D** for Geotechnical Modeling Software
6. **GEOSLOPE** for Slope Stability Analysis
7. **FLAC 2D/3D** for Geotechnical Modeling Software
8. **Civil 3D** for Computer Aided Civil Engineering Drafting
9. **MXROADS SUITE** for Pavement Design, Rehabilitation and Renewal.
10. **KENPAVE** for Pavement Design and Rate Analysis of

Roads

11. **SYNCHRO** for Traffic Signal Timing and Analysis Software
12. **MIKE-SHE** for Hydrologic and Hydraulic Modeling
13. **HEC-HMS** for Hydrologic Modeling System
14. **SWMM** for Storm Water Management Model
15. **SWAT** for Soil and Water Assessment Tool
16. **EPANET** for Hydraulic and Water Quality Behavior of Water Distribution System
17. **OPENFOAM** for Fluid Flow Simulation and Analysis
18. **Visual MODFLOW** for Water Resources Engineering
19. **PRIMAVERA** for Project Management
20. **MSPROJECT** for Project Management
21. **AutoPlotter** for Analysis of Surveying Results
22. **AutoCAD Revit Structure Suite** for Analysis and Design of Various Structural Members
23. **AutoCAD Revit Architecture** for Plotting the Graphical Design of Structural Members
24. **Spread Sheets** for Civil Engineering Applications

Suggested References:

- Software manuals

Note: A minimum of twelve exercises are to be performed covering all technical areas of civil engineering

I B. Tech. – I Semester [CSE, CSSE, IT, CE & ME]

I B. Tech. – II Semester [ECE, EEE & EIE]

(16BT1HS01) TECHNICAL ENGLISH

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PRE-REQUISITES: *English at Intermediate level*

COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading; and Writing.

COURSE OBJECTIVES:

CEO1. To impart knowledge of the nuances of communication.

CEO2. To develop Listening, Speaking, Reading and Writing skills in order to use language effectively in distinct situations.

CEO3. To imbibe an attitude of assimilating language skills in the sequence of locating, retrieving, reporting, evaluating, integrating, and accurately citing in the required context.

COURSE OUTCOMES: On successful completion of this course, the students will be able to

CO1: Demonstrate knowledge in

- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2: Analyze the possibilities and limitations of language, understanding

- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3: Design and develop functional skills for professional practice.

CO4: Apply writing skills in preparing and presenting documents

CO5: Function effectively as an individual and as a member in diverse teams.

CO6: Communicate effectively with the engineering community and society in formal and informal situations.

DETAILED SYLLABUS:

UNIT I - INTRODUCTION TO COMMUNICATION: (9 periods)

Introduction – Language as a Tool of Communication – Communicative Skills (Listening, Speaking, Reading and Writing) – Effective Communication – Modes of Communication – Barriers to Communication (classification)

UNIT II - ACTIVE LISTENING: (9 periods)

Introduction – Reasons for poor Listening – Traits of a Good Listener – Listening Modes – Types of Listening – Barriers to Effective Listening – Listening for General Content and Specific Information

UNIT III - EFFECTIVE SPEAKING: (9 periods)

Introduction – Achieving Confidence, Clarity and Fluency – Paralinguistic Features – Barriers to Speaking – Types of Speaking – Persuasive Speaking

UNIT IV - READING: (9 periods)

Introduction and Reading Rates – Reading and Interpretation – Intensive and Extensive Reading – Critical Reading – Reading for Different Purposes – SQ3R Reading Technique – Study Skills

UNIT V – WRITING: (9 periods)

Introduction – Language – Elements of Style – Techniques for Good Technical Writing – Referencing and Styling – Right Words and Phrases – Sentences

Total Periods: 45

TEXT BOOKS:

1. Meenakshi Raman & Sangeetha Sharma, *Technical Communication*, Oxford University Press, New Delhi, 2012.

REFERENCE BOOKS:

1. Ashraf Rizvi, *Effective Technical Communication*, McGraw-Hill Education (India) Pvt.Ltd., New Delhi, 2015.
2. Sanjay Kumar & Pushp Lata, *Communication Skills*, Oxford University Press, New Delhi, 2013.

3. Teri Kwal Gamble and Michael Gamble, *Communication Works*, Tata Mc Graw-Hill, New Delhi, 2010.
4. Rajendra Pal and J.S. Korlahalli, *Essentials of Business Communication*, Sultan Chand and Son, New Delhi, 2010.

14BT1HS01: TECHNICAL ENGLISH

I -Year B.Tech.

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	2	-	-	4

COURSE OBJECTIVES:

1. To lay basic foundation and impart knowledge of English language, grammar and communication skills.
2. To develop listening, speaking, reading and writing skills among students needed in their personal, academic and professional pursuits.
3. To train students apply the nuances of English for various communication needs.
4. To build confidence in effective usage of English language.

COURSE OUTCOMES : After completion of the course the students will be able to

1. Acquire fundamental and functional knowledge of English language, grammar and communication skills.
2. Identify and analyze productive skills (speaking and writing) and receptive skills (listening and reading) of English language proficiency for effective communication and practice.
3. Design and develop functional skills for professional practice through English.
4. Communicate effectively with the engineering community and society to comprehend and deliver effective solutions.
5. Inculcate an attitude to upgrade competence of English knowledge and communication to engage in independent and life-long learning.

DETAILED SYLLABUS:

UNIT – I : (10 periods)

My Early Days, A. P. J. Abdul Kalam from **Technical English for Engineers** by Cambridge University Press for India Pvt Ltd. (2014).

Communication: Importance of communication-- Language as a tool of Communication – Communicative Skills (Listening, Speaking, Reading and Writing) – Effective Communication – Verbal and Non-verbal Communication

UNIT – II :**(10 periods)**

A Speech by N. R. Narayana Murthy from **Technical English for Engineers** by Cambridge University Press for India Pvt Ltd. (2014).

Listening: Meaning and Art of Listening – Importance of Listening– Traits of a Good Listener - Reasons for poor Listening –Types of Listening – Barriers to Effective Listening

UNIT – III :**(10 periods)**

The Town by the Sea by Amitav Ghosh from **Technical English for Engineers** by Cambridge University Press for India Pvt Ltd. (2014).

Speaking: Achieving Confidence, Clarity, and Fluency – Paralinguistic Features – Types of Speaking – Barriers to Speaking.

UNIT – IV :**(10 periods)**

Dr. C. V. Raman: The Celebrated Genius from **Technical English for Engineers** by Cambridge University Press for India Pvt. Ltd., (2014).

Reading: Reading and Interpretation—Intensive and Extensive Reading—Critical Reading-- Reading Comprehension-- Techniques for Good Comprehension – SQ3R Reading Technique

UNIT – V :**(10 periods)**

Lesson Entitled **The Model Millionaire** from **Technical English for Engineers** by Cambridge University Press for India Pvt. Ltd. (2014).

Writing: Characteristics -- Language –Elements of Style – Techniques for Good Technical Writing – Avoiding Plagiarism and Referencing and Styling.

Total periods: 50**TEXT BOOKS:**

1. **Technical English for Engineers**, Cambridge University Press for India Pvt. Ltd., First Edition, (2014),
2. Meenakshi Raman & Sangeetha Sharma, **Technical Communication**, Oxford University Press, New Delhi, 2012.

REFERENCE BOOKS:

1. M. Ashraf Rizvi, **Effective Technical Communication**, Tata McGraw–Hill, Publishing Company Limited, First Edition, 2005.

2. Martin Hewings, **Advanced English Grammar: A Self Study Reference and Practice Book for Advanced South Asian Students**, Cambridge University press, First South Asian Edition, 1999, New Delhi.

I B. Tech. – I Semester (CSE, CSSE, IT, CE & ME)

I B. Tech. – II Semester (ECE, EEE & EIE)

(16BT1HS31) ENGLISH LANGUAGE LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	0	0	3	2

PRE-REQUISITES: English at intermediate or equivalent level.

COURSE DESCRIPTION: Phonetics; Vocabulary Building; Functional Grammar; Just a Minute; Elocution/Impromptu; Giving Directions/Conversation Starters; Role Play; Public Speaking; Describing People, Places, Objects and Events; Reading Comprehension; Listening Comprehension; Information Transfer.

COURSE OBJECTIVES:

CEO1: To impart the knowledge of native pronunciation through Phonetics.

CEO2: To enhance Listening, Speaking, Reading and Writing skills for effective usage of language in formal and informal situations.

CEO3: To imbibe a positive attitude of learning the language through computer-aided multimedia instructions.

COURSE OUTCOMES: On successful completion of this course the students will be able to

CO1: Demonstrate knowledge in

- Phonetics
- Information Transfer

CO2: Analyze the situations in professional context by using

- Vocabulary
- Grammar

CO3: Design and develop functional skills for professional practice.

CO4: Apply the techniques of Listening and Reading skills to comprehend Listening and Reading comprehension.

CO5: Function effectively as an individual and as a member in diverse teams through

- Extempore talk and
- Role Play

CO6: Communicate effectively in public speaking in formal and informal situations.

CO7: Recognize the need to engage in lifelong learning to upgrade competence of knowledge and communication.

LIST OF EXERCISES:

1. Phonetics
2. Vocabulary Building
3. Functional Grammar
4. Just a Minute
5. Elocution/Impromptu
6. Giving Directions/Conversation Starters
7. Role Play
8. Public Speaking
9. Describing People, Places, Objects and Events.
10. Reading Comprehension
11. Listening Comprehension
12. Information Transfer

Total Lab Slots: 10

TEXT BOOK:

1. Department Lab Manual

REFERENCE BOOKS:

1. D. Sudha Rani, *A Manual for English Language Laboratories*, Pearson, Noida, 2010.
2. D. Sudha Rani, *Advanced Communication Skills Laboratory Manual*, Pearson, Noida, 2012.
3. R. Manivannan and G. Immanuel, *Communication Skills Laboratory*, VK Publications, Sivakasi, 2013
4. Nira Kumar, *English Language Laboratories*, PHI Learning Pvt. Ltd., New Delhi, 2011.

(14BT1HS02) ENGLISH LANGUAGE COMMUNICATION SKILLS LABORATORY

B. Tech. – I year

(Common to All branches of Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	3

COURSE OBJECTIVES:

1. To impart practical knowledge in segmental features, supra-segmental features and Para- linguistic features.
2. To develop language skills for effective communication with clarity and precision in academic, professional and personal situations.
3. To apply the practical knowledge of functional grammar and vocabulary enrichment in effective writing.
4. To develop interest in English language so that the students use it effectively in various formal, informal and neutral situations.

COURSE OUTCOMES:

On the successful completion of the course, the students will / should be able to

1. Gain practical knowledge in
 - English Speech Sounds
 - Stress Patterns in word and sentence
 - Intonation Patterns
 - Paralinguistic Features
 - Vocabulary Enrichment
2. Analyse the functional part of the grammatical elements for writing grammatically correct English in various academic and personal practices.
3. Develop various language functions to fulfil the purpose of speaking and writing in academic, professional and personal contexts
4. Apply the knowledge of the usage of various language software for enhancing the language skills more and more thereby acquiring unconsciously the language functions and elements that are commonly used in various contexts
5. Communicate effectively with engineering community and society in various formal, informal and neutral situations.
6. Demonstrate various language functions by participating in
 - Just A Minute
 - Impromptu Speech
 - Elocution
 - Role Plays
 - Presentations
7. Engage in lifelong learning for the development of the communicative competence
for meeting the global challenges.

DETAILED LIST OF EXPERIMENTS / LAB PRACTICE SESSIONS:

1. English Speech Sounds and Phonemic Transcription
2. Word Stress & Sentence Stress
3. Accent, Rhythm and Intonation
4. Paralinguistic Features.
5. Vocabulary Building
 - a. Importance of Vocabulary Enrichment in Speaking: Spelling
 - b. Synonyms – Antonyms – prefix – Suffixes – One Word Substitutes
 - c. Idioms and Phrases – Homophones – Homonyms – Homographs.
6. Functional Grammar
 - a. Parts of Speech
 - b. Tenses
 - c. Change of Speech
 - d. Change of Voice
 - e. Word Order& Error Correction
 - f. Essay Writing
7. Just a Minute, Impromptu Speech & Elocution
8. Role Plays
9. Telephonic Etiquette
10. Listening Skills
11. Describing People, Places and Objects
12. Presentation Skills
13. Information Transfer

REFERENCES :

1. Departmental Lab Manual

I B. Tech. – I/II Semester**(16BT1BS02) ENGINEERING PHYSICS**

(Common to all branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PRE-REQUISITES: Intermediate / senior secondary Physics

COURSE DESCRIPTION:

Lasers; optical fibers; principles of quantum mechanics; band theory of solids; semiconductors; dielectric properties of materials; acoustics of buildings; superconductors; crystallography and nano materials.

COURSE OBJECTIVES:

CEO1 : To provide the basic knowledge of architectural acoustics, quantum mechanics, lasers, superconductors, optical fibers, semiconductors and nanotechnology.

CEO2 : To develop skills in using semiconductor devices, lasers, and optical fibers.

COURSE OUTCOMES: After completion of the course, a successful student will be able to:

CO1: Acquire basic knowledge of lasers, optical fibers, quantum mechanics, dielectrics, semiconductors, and superconductors, acoustic of buildings, crystallography and nano materials.

CO2: Analyze the construction and working of various laser systems, semiconductor devices, various types of optical fibers and its communication system and nano materials properties.

CO3: Gain skills in designing of lasers, optical fiber cable, semiconductor devices, acoustically good halls and nanomaterials.

CO4: Develop problem solving skills in engineering context.

CO5: Use relevant techniques for assessing ball milling, pulsed laser deposition, pn-junction, Laser

DETAILED SYLLABUS:**UNIT I – LASERS AND FIBER OPTICS
periods)****(11**

Lasers: Introduction, characteristics of lasers, spontaneous and stimulated emission of radiation, Einstein's coefficients – condition for amplification, population inversion, Nd:YAG laser, Helium-Neon laser, semiconductor laser and applications of lasers.

Fiber optics: Introduction, principle of optical fiber, acceptance angle, acceptance cone and numerical aperture, classification of optical fibers optical fiber communication system and applications of optical fibers.

UNIT II – PRINCIPLES OF QUANTUM MECHANICS AND BAND THEORY OF SOLIDS (07 periods)

Principles of Quantum Mechanics: Introduction, de-Broglie's hypothesis, Schrödinger's one dimensional wave equation (time independent), significance of wave function, particle in a one dimensional potential box, Fermi-Dirac distribution and effect of temperature (qualitative treatment).

Band Theory of Solids: Electron in a periodic potential, Kronig-Penney model (qualitative treatment), origin of energy bands formation in solids, distinction between conductors, semiconductors and insulators based on band theory.

UNIT III – SEMICONDUCTORS AND DIELECTRIC PROPERTIES OF MATERIALS (13 periods)

Semiconductors: Introduction, types of semiconductors, intrinsic carrier concentration, electrical conductivity in semiconductors, drift and diffusion currents, Einstein's relation, Hall effect and its applications, direct and indirect band gap semiconductors, p-n junction, energy band diagram of p-n diode, LED, photo diode and Solar cell.

Dielectric Properties of Materials: Introduction, dielectric constant, electronic, ionic and orientation polarizations (qualitative treatment), local field, frequency dependence of polarizability (qualitative treatment), ferroelectricity.

UNIT IV – ACOUSTICS OF BUILDINGS AND SUPERCONDUCTIVITY (07 periods)

Acoustics of Buildings: Introduction, basic requirement of acoustically good hall, reverberation and time of reverberation, Sabine's formula for reverberation time (qualitative treatment), absorption coefficient of sound and its measurement, factors affecting the architectural acoustics and their remedies.

Superconductivity: Introduction, General properties - Meissner effect, penetration depth, Type-I and Type-II superconductors, flux quantization, Josephson effects, BCS theory (qualitative treatment), applications of superconductors.

UNIT V – CRYSTALLOGRAPHY AND NANOMATERIALS (07 periods)

Crystallography: Introduction, crystal planes, crystal directions and Miller indices, separation between successive (hkl) planes, X-ray diffraction by crystal planes, Bragg's law- powder method.

Nanomaterials: Introduction, principles of nanomaterials, properties of nanomaterials, synthesis of nanomaterials by ball milling and pulsed laser deposition and applications of nanomaterials.

Total Periods: 45

TEXT BOOKS:

1. P. K. Palaniswamy, **Engineering Physics**, Scitech Publications India Private Limited, 2nd Edition, 2009

REFERENCE BOOKS:

1. Dr. S. Mani Naidu, **Engineering Physics**, Pearson Education, 1st Edition, 2013.
2. M.N. Avadhanulu, P.G.Kshirsagar, **A textbook of Engineering Physics**, S.Chand & Company Ltd. Revised edition 2014.
3. K. Thyagarajan, **Engineering Physics-I**, McGraw-Hill Education (India) Pvt.Ltd. 2015

(14BT1BS01) ENGINEERING PHYSICS
(Common to All Branches of Engineering)

I Year B. Tech.

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	2	1	--	4

Pre requisite: --

COURSE OBJECTIVES:

1. To provide the basic knowledge of space & time, acoustics principles, quantum mechanics, laser concepts, nanotechnology, superconductors, principles of optical fibers and its communication systems, p-n Junction based devices and zero resistance concepts.
2. To develop skills in using semiconductor devices, lasers, magnetic field intensity and fiber optics.
3. To apply laser techniques and optical fibers in communication technology.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

1. Apply the knowledge of lasers and optical fiber technology in communication systems.
2. Analyze and provide basic information to design acoustically good halls, theatres, sound recording rooms, etc.
3. Gain knowledge of crystal directions and planes and for analyzing the complex crystal structure behavior for engineering and medical applications.
4. Use magnetic materials, lasers and superconductors for the benefit of society.
5. Recognize the importance of lasers, optical fibers and superconductors for effective use in engineering applications.

DETAILED SYLLABI:

UNIT-I: LASERS, FIBER OPTICS AND HOLOGRAPHY
periods)

(18

Lasers: Introduction, characteristics of laser, principles of lasing action, spontaneous and stimulated emission of radiation, Einstein's coefficients, population inversion, ruby laser, Helium-Neon laser, semiconductor laser, applications of lasers.

Fiber optics: Introduction, construction and working principle of optical fiber, acceptance angle, acceptance cone and numerical aperture, types of optical fibers and refractive index profiles, Attenuation and losses in fibers, optical fiber communication system, applications of optical fibers in sensors and medicine.

Holography: Introduction, construction of a hologram, reconstruction of image from hologram, applications.

UNIT-II: SPECIAL THEORY OF RELATIVITY, ACOUSTICS OF BUILDINGS AND CRYSTALLOGRAPHY (16 periods)

Special Theory of Relativity: Introduction, absolute frame of reference, time dilation, length contraction, addition of velocities, mass-energy equivalence, energy-momentum relation.

Acoustics of Buildings: Introduction, basic requirement of acoustically good hall, reverberation and time of reverberation, Sabine's formula for reverberation time (qualitative treatment), absorption coefficient of Sound and its measurement, factors affecting the architectural acoustics and their remedies.

Crystallography: Introduction, crystal planes, crystal directions and Miller indices, separation between successive (hkl) planes, X-ray diffraction by crystal planes, Bragg's law, Laue and powder methods.

UNIT-III :PRINCIPLES OF QUANTUM MECHANICAS AND BAND THEORY OF SOLIDS (17 periods)

Principles of Quantum Mechanics: Black body radiation – Wien's law, Rayleigh-Jeans law and Planck's law (qualitative), waves and particles, matter waves, de-Broglie's hypothesis, G.P. Thomson experiment, Heisenberg's uncertainty principle, Schrödinger's one dimensional wave equation (time independent), significance of wave function, particle in a one dimensional potential box, Fermi-Dirac distribution and effect of temperature (qualitative treatment only), scattering-source of electrical resistance.

Band Theory of Solids: Electron in a periodic potential, Kronig-Penney model (qualitative treatment), origin of energy band formation in solids, effective mass of electron, distinction between metals, semiconductors and insulators based on band theory.

UNIT-IV: DIELECTRIC PROPERTIES OF MATERIALS AND SEMICONDUCTORS (17 periods)

Dielectric Properties of Materials: Introduction, dielectric constant, electronic, ionic and orientation polarizations (qualitative treatment), local field, Clausius-Mossotti equation, frequency dependence of polarisability (qualitative treatment), ferro and piezo electricity.

Semiconductors: Introduction, intrinsic and extrinsic semiconductors, carrier concentration, electrical conductivity in semiconductors, drift and diffusion, Einstein's relation, Hall effect, direct and indirect band gap semiconductors, p-n junction, energy diagram of p-n diode, diode equation (qualitative), LED, photo diode and solar cell.

UNIT-V :MAGNETIC PROPERTIES OF MATERIALS, SUPERCONDUCTIVITY AND NANOMATERIALS (17

periods) Magnetic Properties of Materials: Introduction, origin of magnetic moment, classification of magnetic materials into dia, para, ferro, anti-ferro and ferri magnetism, hysteresis, soft and hard magnetic materials.

Superconductivity: General properties, Meissner effect, penetration depth, Type-I and Type-II superconductors, flux quantization, Josephson effects, BCS theory, applications of superconductors.

Nanomaterials: Introduction, surface area to volume ratio, quantum confinement, properties of nanomaterials, synthesis of nanomaterials by ball milling, plasma arcing, pulsed laser deposition and sol-gel methods, carbon nanotubes-properties and applications, applications of nanomaterials.

Total : 85
periods

TEXT BOOKS :

1. S. Mani Naidu, *Engineering Physics*, Pearson Education, 2013.
2. P. K. Palaniswamy, *Engineering Physics*, Scitech Publications India Private Limited, 2009

REFERENCE BOOKS:

1. R. K. Gaur and S. L. Gupta , *Engineering Physics* , Dhanpat Rai Publications (P) Ltd., 8th Edition, 2001.
2. M. R. Srinivasan ,*Engineering Physics* , New Age International (P) Limited, Publishers, 1st Edition,2010.

I B. Tech. – II Semester

**(16BT2BS01) TRANSFORMATION TECHNIQUES AND PARTIAL
DIFFERENTIAL EQUATIONS**

(Common to all Branches of Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PRE REQUISITE: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z –transforms; partial differential equations.

COURSE OBJECTIVES:

CEO 1: To impart basic knowledge on Fourier series, Fourier transforms, Laplace transforms, z-transforms and partial differential equations.

CEO 2: To develop skills in analyzing the problems, designing mathematical models, Fourier series, Fourier transforms, Laplace transforms, z-transforms and partial differential equations for the problems in engineering.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO 1 :Acquire basic knowledge in

- (a) Fourier series and Fourier transforms
- (b) Fourier integrals
- (c) Laplace transforms and their applications
- (d) z- transforms and their applications
- (e) solving partial differential equations
- (f) Heat transfer and wave motion

CO 2 : Develop skills in analyzing the

- (a) Properties of Fourier series for a given function
- (b) Partial differential equations through different evaluation methods
- (c) Difference equations through z – transforms
- (d) Engineering systems and processes involving wave forms and heat transfer

CO 3 :Develop skills in designing mathematical models for

- (a) Problems involving heat transfer and wave forms
- (b) Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms, z-transforms and difference equations

CO 4 :Develop analytical skills in solving the problems involving

- (a) Fourier series and Fourier transforms
- (b) Laplace transforms
- (c) Z-transforms and difference equations
- (d) Heat transfer and wave motion

CO 5 : Use relevant transformation techniques for

- (a) Obtaining Fourier transforms for different types of functions
- (b) Laplace transforms
- (c) Z- transforms
- (d) Partial differential equations

DETAILED SYLLABUS:

UNIT- I : FOURIER SERIES (7 periods)

Fourier series: Determination of Fourier coefficients, convergence of Fourier series (Dirichlet's conditions), Fourier series of even and odd functions, Half-range Fourier sine and cosine expansions.

UNIT- II: FOURIER INTEGRALS AND FOURIER TRANSFORMS (8 periods)

Fourier integral theorem (statement only), Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms –properties, Inverse transform and finite Fourier transforms.

UNIT-III:LAPLACE TRANSFORMS (12 periods)

Laplace transforms of standard functions. Properties of Laplace transforms. First and second shifting Theorems. Laplace transforms of derivatives and integrals. Inverse transforms. Convolution theorem (without proof), inverse Laplace transforms by convolution theorem. Laplace transform of periodic functions, Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

UNIT-IV : Z- TRANSFORMS (9 periods)

Z – transforms, inverse Z– transforms, damping rule, shifting rule, initial and final value theorems. Convolution theorem(without proof), solution of difference equations by Z– transforms.

UNIT – V : PARTIAL DIFFERENTIAL EQUATIONS (9 periods)

Formation of Partial differential equations – Solutions of first order linear equations by

method of grouping. First and second order equations by method of separation of variables – Solutions of one dimensional Wave equation, Heat equation.

Total no. of periods: 45

TEXT BOOK:

1. T.K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, ***Engineering Mathematics, vol-1***, S. Chand & Company 13/e, 2014.
2. T.K.V. Iyenger, B. Krishna Gandhi, S. Ranganadham and M.V.S.S.N. Prasad, ***Mathematical Methods***, S. Chand and Company, 8/e, 2013

REFERENCE BOOKS:

1. Grewal, B.S., ***Higher Engineering Mathematics***, Khanna publishers, Delhi, 42/e, 2012
2. Kreyszig, E., ***Advanced Engineering Mathematics***, John Wiley and Sons, Inc., 9/e, 2013.

II B. Tech. – II Semester/ III B.Tech – I Semester

(16BT4HS31) SOFT SKILLS LABORATORY

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	0	0	3	2

PRE-REQUISITES:

English Language Laboratory in I B.Tech or English Laboratory at Diploma Level.

COURSE DESCRIPTION:

Body Language; Creative Thinking; Stress Management; Goal Setting; Interpersonal Skills; Leadership Skills; Team Work; Assertiveness; Etiquette; Conflict Management; Report Writing; Group Discussions.

COURSE OBJECTIVES:

CEO1: To impart knowledge of Body Language in order to appreciate non-verbal forms of understanding and expression.

CEO2: To develop the principles in understanding the elements of team, anticipating the problem situation and adopt appropriate steps to remedy.

CEO3: To imbibe an attitude of planning & organizing to set and meet goals.

COURSE OUTCOMES:

On successful completion of this course the students will be able to

CO1: Acquire knowledge in

- Goal Setting
- Creative Thinking
- Leadership Skills
- Team Work

CO2: Analyse the functional knowledge in

- Body Language
- Interpersonal Skills
- Stress Management

CO3: Apply the techniques of soft skills in a problem situation enhanced through multimedia software.

CO4: Function effectively as an individual and as a member in diverse teams.

CO5: Communicate effectively in public speaking in formal and informal situations.

LIST OF EXERCISES:

1. Body Language

2. Creative Thinking
3. Stress Management
4. Goal Setting
5. Interpersonal Skills
6. Leadership Skills
7. Team Work
8. Assertiveness
9. Etiquette
10. Conflict Management
11. Report Writing
12. Group Discussions

Total Lab Slots: 10

TEXT BOOKS:

1. Department Lab Manual.

REFERENCE BOOKS:

1. R. C. Sharma & Krishna Mohan, *Business Correspondence and Report Writing*, Tata McGraw-Hill Publishing Company Limited, Third Edition, New Delhi, 2012.
2. Gopalswamy Ramesh and Mahadevan Ramesh, *The Ace of Soft Skills*, Pearson, Noida, 2010.
3. Jeff Butterfeild, *Soft Skills for Everyone*, Cengage learning, Delhi, 2011.
4. Barun K. Mitra, *Personality Development and Soft Skills*, Oxford University Press, Noida, 2012.

SUGGESTED SOFTWARE:

1. English Language Communication Skills Laboratory Software – SOFTX Technologies Pvt. Ltd., Hyderabad.
2. GEMS – Globarena E- Mentoring System.
3. Speech Solutions.
4. English Pronunciation Dictionary by Daniel Jones.
5. Learning to Speak English 8.1, The Learning Company – 4 CDs.
6. Mastering English: Grammar, Punctuation and Composition.
7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
8. Dorling Kindersley Series of Grammar.
9. Language in Use 1, 2 & 3.
10. Cambridge Advanced Learner's Dictionary - 3rd Edition.
11. Centronix – Phonetics.
12. Let's Talk English, Regional Institute of English South India.
13. The Ultimate English Tutor.

III B. Tech. – II Semester / IV B. Tech. – I Semester

(16BT6HS05) FRENCH LANGUAGE (La Langue Francais)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PRE-REQUISITES

COURSE DESCRIPTION: Oral communications; Basic grammar; advanced grammar; basic writing; Business French (La Francais Commercial)

COURSE OBJECTIVES:

CEO1. To impart knowledge of the nuances of communication.

CEO2. To develop Speaking and Writing skills in order to use French language effectively in distinct situations.

COURSE OUTCOMES: On successful completion of this course, the students will be able to

CO1: Demonstrate knowledge in

- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2: Analyze the possibilities and limitations of language, understanding

- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3: Design and develop language skills for professional practice.

CO4: Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5: Understand French culture and civilization.

CO6: Communicate effectively with the native French in day to day situation.

DETAILED SYLLABUS

UNIT I –ORAL COMMUNICATION: (9 periods)

Introduction - Language as a Tool of Communication, French alphabets, Phonetics and pronunciation, making contacts, giving information, Arranging things, Expression of feelings.

UNIT II –BASIC GRAMMAR: (9 periods)

Introduction -Articles, -Er ending Verbs, Nouns, Numbers, Gender, Pronouns, Sentence structure – Case study.

UNIT III –ADVANCED GRAMMAR: (9 periods)

Introduction -Adjectives, Prepositions, Introduction to tenses – Present tense, past tense and future tense, Active and Passive voice.

UNIT IV –BASIC WRITING: (9 periods)

Introduction -Introduction to written communication, Pre-writing, Creating context for writing and Data collection, fill in forms, Write greeting cards, Invitations and Short personal announcements, Short text to describe photos and pictures.

UNIT V –BUSINESS FRENCH (La Francais Commercial) (9 periods)

Introduction - E-mail writing, Letter writing, Learning technical vocabulary and its application.

Case study of influential French companies, Learning computer/desktop/new age-media vocabulary, Introduction to how to present a topic, Fixing an Appointment

Total Periods: 45

TEXT BOOKS:

1. Annie Berther, **Alter Ego** , Hachette Publications, 2012

REFERENCE BOOKS:

- 1 Regine Merieux, Yves Loiseau, **Connexions** , Goyall Publishers, 2011
- 2 Delphine Ripaud, **Saison**, French and Euroean Inc., 2015

III B. Tech. – II Semester / IV B. Tech. – I Semester

(16BT6HS06) GERMAN LANGUAGE

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PRE-REQUISITES

COURSE DESCRIPTION: Oral communication; Basic grammar; Advanced grammar; Basic writing; Business German

COURSE OBJECTIVES:

CEO3. To impart knowledge of the nuances of communication.

CEO4. To develop Speaking and Writing skills in order to use German language effectively in distinct situations.

COURSE OUTCOMES: On successful completion of this course, the students will be able to

CO1: Demonstrate knowledge in

- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2: Analyze the possibilities and limitations of language, understanding

- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3: Design and develop language skills for professional practice.

CO4: Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5: Understand German culture and civilization.

CO6: Communicate effectively with the native German in day to day situation.

DETAILED SYLLABUS

UNIT I –ORAL COMMUNICATION: (9 periods)

Introduction - Language as a Tool of Communication, German alphabets, Phonetics and pronunciation, making contacts, giving information, Arranging things, Expression of feelings.

UNIT II –BASIC GRAMMAR: (9 periods)

Introduction –Articles, Verbs, Nouns, Numbers, Gender, Pronouns, Sentence structure – Case study.

UNIT III –ADVANCED GRAMMAR: (9 periods)

Introduction -Adjectives, Prepositions, Introduction to tenses – Present tense, past tense and future tense, Active and Passive voice, Introduction to Case- Akkusativ, Nominativ, Dativ&Genetiv Case.

UNIT IV –BASIC WRITING: (9 periods)

Introduction -Introduction to written communication, Pre-writing, Creating context for writing and Data collection, fill in forms, Write greeting cards, Invitations and Short personal announcements, Short text to describe photos and pictures.

UNIT V –BERUFSDEUTCSCH (BUSINESS GERMAN): (9 periods)

Introduction - E-mail writing, Letter writing, Learning technical vocabulary and its application.

Case studies of influential German companies, Learning computer/desktop/new age-media vocabulary, Introduction to how to present a topic, Fixing an Appointment.

Total Periods: 45

TEXT BOOKS:

1. Heuber, **Tangram Aktuelleins**, Heuber Verlag Publications , 2011.

REFERENCE BOOKS:

1. Anta Kursisa, Gerhard Newner, Sara vicenta, **Fir fuer Deutsch 1 und Deutsch 2**, Heuber Verlag Publications, 2005
2. Herman Funk, **Studio D A1**, Cornelsen GOYAL SAAB Publication, 2011.

III B. Tech. – II Semester / IV B. Tech. – I Semester

(16BT6HS07) INDIAN CONSTITUTION

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	0	3

PRE-REQUISITES: ---

COURSE DESCRIPTION: Elements, functions and functionaries according to Indian Constitution, understanding for better professional practice and good citizenry

COURSE OBJECTIVES:

CEO1: To familiarize the students with parliamentary proceedings, legislature, and administration federal system and judiciary of India, civil services, Indian and international politics

CEO 2: To imbibe attitude for ethical behavior and attitude within provision of Constitution

COURSE OUTCOMES: After successful completion of the course the students will be able to

CO1: Gain knowledge in

- parliamentary proceedings, laws, legislature, administration and its philosophy
- federal system and judiciary of India
- social problems and public services like central civil services and state civil services
- Indian and international political aspects and dynamics

CO2 : Develop etiquette and professional behavior in line with the constitution of India for becoming a responsible citizen

DETAILED SYLLABUS :

UNIT- I : PREAMBLE AND ITS PHILOSOPHY (8 periods)

Introduction and Evolution of Indian Constitution, preamble and its Philosophy.

UNIT- II : UNION GOVERNMENT (8 periods)

Powers, Functions and Position of President, Vice-President and Council of Ministers, Composition of parliament, Constitution Amendment Procedure, Financial Legislation in Parliament.

UNIT-III :FEDERAL SYSTEM (14 periods)

Centre-State relations, Directive Principles of State Policy, Fundamental Rights and Duties, Centre-State Relations, Features of Federal System, Administrative Relationship between Union and States, Powers, Functions and Position of Governors, Function of Chief Ministers, Council of Ministers, Composition and powers of the State Legislature.

UNIT-IV :JUDICIARY AND PUBLIC SERVICES (10 periods)

The Union Judiciary - Supreme Court and High Court, All India Services, Central Civil Services, State Services, Local Services and Training of Civil Services.

UNIT-V : INTERNATIONAL POLITICS (5 periods)

Foreign Policy of India, International Institutions like UNO, WTO, SAARC and Environmentalism.

Total periods : 45

TEXT BOOK:

1. Brijji Kishore Sharma, ***Introduction to the Constitution of India***, Prentice Hall of India, 2005.

REFERENCE BOOKS:

1. Mahendra Pal Singh,V. N. Shukla's ***Constitution of India***, Eastern Book Company, 2011.
2. Pandey J. N., ***Constitutional Law of India*** - Central Law Agency, 1998

III B. Tech. – II Semester / IV B. Tech. – I Semester

(16BT6HS08) INDIAN ECONOMY

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	0	3

PRE-REQUISITES: --

COURSE DESCRIPTION:

Introduction; Time Value of Money; Elementary Economic Analysis; Value Analysis/Value Engineering; Economic Planning.

COURSE OBJECTIVES:

CEO1: To familiarize the students with the concept of elementary principles of Indian economy and their operational significance from engineering perspective.

CEO2: To develop skills for effective use of principles of economy in firm/industry/corporation in public or private sector.

COURSE OUTCOMES: On successful completion of this course the students will be able to

CO1:Acquire the knowledge in

- Micro and Macro Economics.
- Traditional and Modern methods of Capital Budgeting.
- Five year plans and NITI Aayog.

CO2: Analyze

- Capital Budgeting.
- Value Analysis and Value Engineering.
- Economic analysis
- Law of supply and demand

CO3 :Ability to understand the nuances of project management and finance

DETAILED SYLLABUS:

UNIT – I: INTRODUCTION (9 Periods)

Economics- Flow in an Economy, Law of Supply and Demand; Micro and Macro Economics; Relationship between Science, Engineering, Technology, and Economic Development; Concept of Engineering Economics-Types of Efficiency, Definition and Scope of Engineering Economics.

UNIT – II: TIME VALUE OF MONEY (12 Periods)

Concepts and Application; Capital Budgeting-Traditional and Modern Methods; Simple and Compound Interest, Cash Flow Diagram, Principle of Economic Equivalence; Evaluation of Engineering Projects – Present Worth Method, Future Worth Method, Annual Worth Method, Internal Rate of Return Method, Cost-benefit Analysis in Public Projects; Depreciation Policy-Depreciation of Capital Assets, Causes of Depreciation, Straight Line Method and Declining Balance Method.

UNIT – III: ELEMENTARY ECONOMIC ANALYSIS (9 Periods)

Economic Analysis – Meaning, Significance, Simple Economic Analysis; Material Selection for a Product, Substitution of Raw Material; Design Selection for a Product; Material Selection-Process Planning, Process Modification.

UNIT - IV: VALUE ANALYSIS/VALUE ENGINEERING (6 Periods)

Introduction- Value Analysis, Value Engineering, Functions, Aims; Value Analysis vs. Value Engineering; Value Engineering Procedure- Advantages, Application Areas.

UNIT- V: ECONOMIC PLANNING (9 Periods)

Introduction- Need For Planning in India, Five year plans(1951-2012), NITI Aayog (from 2014 onwards); Inclusive Growth-Meaning, Significance, Need for inclusive growth in India, Strategy for more inclusive growth, Challenges and Prospects; Employment and Inclusive Growth in India, Role of engineers in sustaining inclusive growth.

Total Periods: 45

TEXT BOOKS

1. Panneerselvam R. ,**Engineering Economics** , PHI Learning Private Limited, Delhi , 2/e,2013.
2. Jain T.R., V. K.Ohri, O. P. Khanna. **Economics for Engineers**. VK Publication, 1/e, 2015.

REFERENCE BOOKS

1. Dutt Rudar & Sundhram K. P. M.**Indian Economy**.S. Chand, New Delhi, 62 revised edition 2010.
2. Misra, S.K. & V. K. Puri. **Indian Economy: Its Development Experience**. Himalaya Publishing House, Mumbai 32/e ,2010.

III - B. Tech. II -Semester./ IV - B. Tech. I - Semester

(16BT6HS09) INDIAN HERITAGE AND CULTURE

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	0	3

PRE-REQUISITES: ---

COURSE DESCRIPTION: Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.

COURSE OBJECTIVES:

CE05. To impart the knowledge on history of India and process of evaluation of Indian Culture and its importance.

CE06. To develop analytical mind on the administrative hierarchies through the study of ancestral administration and study its relevance to the existing administrative set up

CE07. To imbibe an attitude of having harmonious relations within society.

COURSE OUTCOMES: On successful completion of this course, the students will be able to

CO1: Acquaint knowledge in

- (a) human aspirations and values in Vedic culture.
- (b) cultural aspects of Buddhism and Jainism
- (c) unification of our country under Mourya's and Gupta's administrations
- (d) socio Religious aspects of Indian culture
- (e) reform movements and harmonious relations.

CO2 : Apply ethical principles and reforms as models for the upliftment of the societal \ status in the present cultural contexts

DETAILED SYLLABUS:

UNIT I - : BASIC TRAITS OF INDIAN CULTURE (9 periods)

Meaning and definition and various interpretations of culture. Culture and its features. The Vedic and Upanishadic culture and society. Human aspirations and values in these societies. Chaturvidha purushardhas, Chaturashrma and Chaturvarna theory.

UNIT II - : HUMANISTIC REFORMS UNDER JAINISM AND BUDDHISM (9 periods)

Salient features of Jainism - contributions of Jainism to Indian culture. Contributions of Achaarya and Mahaapragya. Buddhism as a humanistic culture. The four noble truths of Buddhism. Contributions of Buddhism to Indian culture.

Unit- III : CULTURE IN THE MEDIEVAL PERIOD (9 periods)

Unifications of India under Mouryas and Guptas and their cultural achievements. Cultural conditions under satavahanas. Contributions to pallavas and cholas to art and cultural achievements of vijayanagara rulers.

Unit- IV : SOCIO RELIGIOUS REFORMS IN INDIAN CULTURE (9 periods)

Western impact on India, Introduction of western education, social and cultural awakening and social reform movements of Rajaramohan Roy - Dayanandha Saraswathi- Anne Besant. (theosophical society)

Unit- V : REFORM MOVEMENTS FOR HARMONIOUS RELATIONS (9 periods)

Vivekananda, Eswarchandra vidyasagar and Veeresalingam- emancipation of women and struggle against caste. Rise of Indian nationalism. Mahatma Gandhi- Non violence and satyagraha and eradication of untouchability .

Total Periods: 45

TEXT BOOKS:

1. Valluru Prabhakaraiah, **Indian Heritage and Culture**, Neelkamal Publications Pvt. Ltd. Delhi, 1/e , reprint 2015.

REFERENCE BOOKS:

1. L. P. Sharma, **History of Ancient India**, Konark Publishers, Pvt. Ltd. New Delhi, 2010.
2. L. P. Sharma, **History of Medieval India**, Konark Publishers, Pvt. Ltd. New Delhi, 2010.
3. L. P. Sharma, **History of Modern India**, Konark Publishers, Pvt. Ltd. New Delhi, 2010.

4. The Cultural Heritage of India Vol-I, II, III, IV, V, The Ramakrishna Mission Institute of Culture, Calcutta.

III B. Tech. – II Semester / IV B. Tech. – I Semester

(16BT6HS10) INDIAN HISTORY

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	0	3

PRE-REQUISITES: ----

COURSE DESCRIPTION: Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.

COURSE OBJECTIVES:

CEO1: To familiarize the students with elements of Indian history by which they could correlate contemporary issues and problems in Indian society.

CEO 2: To develop analytical skills on social processes of civilizations, modernization and social change

CEO 3: To imbibe culture that will enhance them to be better citizens of the nation

COURSE OUTCOMES: After successful completion of the course the students will be able to

CO 1: Gain knowledge on evolution and history of India as a nation

CO2: Analyze social and political situations of past and current periods

CO3: Practice in career or at other social institutions morally and ethically

DETAILED SYLLABUS:

UNIT-I : INTRODUCTION (8 periods)

Elements of Indian History; History Sources: Archaeology, Numismatics, Epigraphy & Archival research; Methods used in History; History & historiography; sociological concepts-structure, system, organization, social institutions, Culture and social stratification (caste, class, gender, power), State & Civil Society.

UNIT-II : ANCIENT INDIA (9 periods)

Mohenjo-Daro civilization; Harappa civilization; Mauryan Empire.

UNIT -III: CLASSICAL & MEDIEVAL ERA (12 periods)

Classic Era (200 BC - 1200 AD); Hindu - Islamic Era (1200 - 1800 AD).

UNIT-IV: MODERN INDIA (6 periods)

Age of Colonialism (17th - 19th centuries); First war of Indian Independence; Freedom Struggle (1857-1947).

UNIT-V :INDIA AFTER INDEPENDENCE (1947 -) (10 periods)

The Evolution of the Constitution and Main Provisions; Consolidation of India as a Nation; Politics in the States; Indian economy; Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and inclusion, Changing

Nature of work and organization.

Total periods : 45

TEXT BOOK:

1. K. Krishna Reddy, **Indian History**, Tata McGraw-Hill, 21st reprint, 2017

REFERENCE BOOKS:

1. Guha, Ramachandra, **India after Gandhi**, Pan Macmillan, 2007 Thapar, Romila, **Early India**, Penguin, 2002

III B. Tech. – II Semester (CSE, CSSE, IT, CE & ME)

IV B. Tech. – I Semester (ECE, EEE & EIE)

(16BT6HS11) PERSONALITY DEVELOPMENT

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	0	3

PRE-REQUISITES: Soft Skills Lab

COURSE DESCRIPTION:

Self-esteem & Self-Management; Developing Positive Attitudes; Self-Motivation & Self-Management; Getting Along with the Supervisor; Workplace Success.

COURSE OBJECTIVES:

CEO1: To make students understand the concept and components of personality and thereby to apply the acquired knowledge to themselves and mould their personality.

CEO2: To impart training for positive thinking, that enables the students to be in a good stead to face the challenges,

CEO3: To imbibe an attitude of planning & organizing to set and meet goals.

COURSE OUTCOMES: On successful completion of this course the students will be able to

CO1: Demonstrate knowledge in

- Self-Management
- Planning Career

CO2: Analyze the situations based on

- Attitudes
- Thinking strategies

CO3: Design and develop the functional skills for professional practice in

CO4: Function effectively as an individual and as a member in diverse teams.

CO5: Communicate effectively in public speaking in formal and informal situations.

DETAILED SYLLABUS:

UNIT – I: SELF-ESTEEM & SELF-IMPROVEMENT (9 Periods)

Know Yourself – Accept Yourself; Self-Improvement: Plan to Improve – Actively Working to Improve Yourself.

Case study: 1

UNIT – II: DEVELOPING POSITIVE ATTITUDES (9 Periods)

How Attitudes Develop – Attitudes are Catching – Improve Your Attitudes.

Case study: 2

UNIT – III: SELF-MOTIVATION & SELF-MANAGEMENT (9 Periods)

Show Initiative – Be Responsible Self-Management; Efficient Work Habits – Stress Management – Employers Want People Who can Think – Thinking Strategies.

Case study: 3

UNIT – IV: GETTING ALONG WITH THE SUPERVISOR (9 Periods)

Know your Supervisor – Communicating with Your Supervisor – Special Communications With Your Supervisor – What Should You Expect of Your Supervisor? – What Your Supervisor Expects of You – Moving Ahead Getting Along with Your Supervisor.

Case study: 4

UNIT - V: WORKPLACE SUCCESS (9 Periods)

First Day on the Job – Keeping Your Job – Planning Your Career – Moving ahead.

Case study: 5

Total

Periods: 45

TEXT BOOK:

1. Harold R. Wallace and L. Ann Masters, *Personality Development*, Cengage Learning, Delhi, Sixth Indian Reprint 2011.

REFERENCE BOOKS:

1. Barun K. Mitra, *Personality Development and Soft Skills*, Oxford University Press, New Delhi, 2011.
2. Stephen R. Covey, *The 7 Habits of Highly Effective People*, Free Press, New York, 1989
3. K. Alex, *Soft Skills*, S. Chand & Company Ltd, New Delhi, Second Revised Edition 2011.
4. Stephen P. Robbins and Timothy A. Judge, *Organizational Behaviour*, Prentice Hall, Delhi, 16th Edition 2014.

III B. Tech. – II Semester / IV B. Tech. – I Semester

(16BT6HS12) PHILOSOPHY OF EDUCATION

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	0	3

PRE-REQUISITES: ---

COURSE DESCRIPTION: Introduction to Philosophy and Engineering Education; Philosophical methods and their implications in engineering; Philosophical education in India; Values and Engineering education; Outcome based education.

COURSE OBJECTIVES:

CEO1: To familiarize the students with the fundamentals of educational philosophical methods.

CEO2: To impart skills in applying the contextual knowledge of Engineering education and responsibilities.

CEO3: To imbibe an attitude to inculcate and implement values of engineering education.

COURSE OUTCOMES: On successful completion of this course the students will be able to

CO1: Acquire knowledge in

- Philosophy of Engineering education.
- Philosophical Methods.
- Knowledge acquiring methods.
- Engineering education and responsibilities.

CO2: Understand the impact of Outcome Based Education for effective educational outcomes

CO3: Apply reasoning to assess societal issues with the contextual knowledge of engineering education and responsibilities.

DETAILED SYLLABUS :

Unit- I:INTRODUCTION TO PHILOSOPHY ANDENGINEERING EDUCATION
(9 periods)

Concept , Significance, and Scope of Philosophy in Engineering – Aims of Engineering Education – relationship between philosophy and engineering education – speculative, normative and critical approaches of philosophy in engineering.

Unit- II :PHILOSOPHICAL METHODS AND THEIR IMPLICATIONS IN ENGINEERING

**(9
periods)**

Introduction to Philosophical approaches: Idealism, Naturalism, Pragmatism, Realism and Existentialism; Significance and Scope in Engineering Education.

Unit: III :PHILOSOPHICAL EDUCATION IN INDIA (9 periods)

Different branches of philosophy- meaning, Epistemology: nature and scope; Knowledge acquiring methods; Kinds and instruments of knowledge; Re-shaping of educational thoughts by Indian thinkers: Rabindranath Tagore, Sri Aurobindo Gosh, Mahatma Gandhi, Jiddu Krishnamurthy and Swamy Vivekananda.

Unit- IV:VALUES AND ENGINEERING EDUCATION (9 periods)

Introduction; Engineering education and responsibilities: health, social, moral, ethics aesthetic; Value: crisis and strategies for inculcation;
Case study: Engineering Solutions given by Mokshagundam Visvesvaraya

Unit-V :OUTCOME- BASED EDUCATION (9 periods)

Institutional visioning ;educational objectives ; programme outcomes , curriculum, stakeholders, infrastructure and learning resources ; governance and management, quality in education.

Total periods: 45

TEXT BOOKS :

1. Ganta Ramesh, ***Philosophical Foundations of Education***, Neelkamal Publications, 1/e,2013
2. Carl Micham, ***Thinking through technology(The Paths between Engineering and Philosophy)***.University of Chicago Press, 1/e,1994.
3. Louis L Bucciarelli, ***Engineering Philosophy***, Delft University Press,1/e, 2003.

4. NBA/ABET Manuals.

REFERENCE BOOKS :

1. Louis L Bucciarelli, ***Philosophy of Technology and Engineering Sciences***, North Holland, 1/e, 2009 (e-book).
2. Samuel Florman, ***Existential pleasures of education***. Martins's Griffin S.T. publication, 1/e, 1992.

III B. Tech. – II Semester / IV B. Tech. – I Semester

(16BT6HS13) PUBLIC ADMINISTRATION

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	0	3

PRE-REQUISITES: Nil

COURSE DESCRIPTION:

Introduction; Public Policy; Good Governance; E-Governance; Development Administration.

COURSE OBJECTIVES:

CEO1: To familiarize the students with the theories, concepts and practices of public administration from engineering perspective.

CEO2: To develop critical thinking and problem solving skills for effective practice of Good Governance and Administrative Development that are applied in the chosen domain.

CEO3: To imbibe an attitude of understanding and implementing administration policies for sustainable development in distinguished sectors.

COURSE OUTCOMES: On successful completion of this course the students will be able to

CO1: Acquire knowledge in

- Public Policy.
- Good Governance.
- E-governance.
- Development Administration.

CO2: Analyze the possibilities and limitations of existing policies through Good Governance perspective.

CO3: Design and develop solutions in e-governance models to find and provide opportunities in e-governance.

CO4: Adopt principles of e-governance in addressing the existing issues and challenges in e-governance sector.

CO5: Understand the significance of Administrative Development in finding professional engineering solutions by probing

- Bureaucracy.

- Role of civil society.

DETAILED SYLLABUS :

UNIT – I: INTRODUCTION (9

Periods)

Public and Private Administration- Differences and Similarities, Meaning, Scope; Importance of Public Administration in Modern Era; Public Administration and its implications in the field of Engineering.

Case Study: Unique Identification Authority of India (UIDAI): Aadhaar Project: Challenges Ahead

UNIT – II: PUBLIC POLICY (9

Periods)

Meaning and Scope; Policy Formulation in India; Policy making process; Policy Implementation

Engineering and Public Policy, Social, ethical, Monetary and fiscal policies; policy implications of engineering; The engineer's role in Public Policy.

Case Study: NITI Aayog: Demonetization and Aftermath of Demonetization – Cashless transactions.

UNIT – III: GOOD GOVERNANCE (9

Periods)

Significance; Objectives; Concepts; Reforms; Organization and its basic problems Administrative and Governance reforms in India; Sustainable and Inclusive growth in India; Engineering and Sustainable Environment-Role of Engineers; Right to information Act

Case Study: Strategies in Good Governance: A Case Study of Karnataka, Kerala and Orissa.

UNIT – IV: E-GOVERNANCE (9

Periods)

Meaning, Significance, Issues in E-governance; E-governance Models, Problems and Opportunities; Application of Data Warehousing and Data Mining in Governance; Engineers role in re-engineering E-governance.

Case Study: e-Housing System for Bhavana Nirman Dhanasahayam Online disbursement of housing assistance in Kerala.

UNIT - V: DEVELOPMENT ADMINISTRATION (9

Periods)

Introduction; Development Administration-Administrative Development- Sustainable Development -Significance- Objectives; Bureaucracy - Personnel administration and human resources development; Role of civil society-Citizens and administration; Development and Engineering: Issues Challenges and Opportunities.

Case Study: Neeru-Chettu (Water-Tree) of Andhra Pradesh.

Case Study: TPDDL of Delhi and Odisha.

Total Periods: 45

TEXT BOOKS

1. M.P. Sharma, B.L. Sadana, HarpreetKaur. ***Public Administration in Theory and Practice***. KitabMahal, Mumbai, 1/e,2014.
2. CSR Prabhu, ***E. Governance – concepts and case studies***.PHI, New Delhi, 2/e 2012.

REFERENCE BOOKS

1. Surendra Munshi, Bijupaul Abraham ***Good Governance, Democratic societies and Globalization***, Sage publications, New Delhi,1/e ,2004.
2. R.K.Sapru, ***Public Policy***, Sterling Publishers Pvt Ltd., New Delhi, 1/e, 2001.

I B. Tech. - IISemester
(16BT20252)MATLABPracticeforCivil Engineers

(Civil Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	3	2

PRE-REQUISITE: Mathematics at Intermediate Level and Principles of Computer Programming.

COURSE DESCRIPTION: Exercises on MATLAB Basics; Arrays; Functions and Files; Programming Techniques; Plotting; Linear Algebraic Equations; Polynomials; Simulink.

COURSE OUTCOMES:

After successful completion of the course, student will be able to

- CO1.** Apply knowledge of MATLAB basics.
- CO2.** Carry out numerical computations and analysis.
- CO3.** Design solutions for engineering problems using MATLAB.
- CO4.** Develop solutions for complex civil engineering problems using MATLAB Programming and Simulation.
- CO5.** Use MATLAB Tool boxes for civil engineering applications.
- CO6.** Communicate effectively on MATLAB Applications in Civil Engineering in written, oral and graphical forms.

DETAILED SYLLABUS:

LIST OF EXERCISES:

A) BASICS OF MATLAB

- 1. MATLAB Windows
- 2. Help
- 3. Input and Output
- 4. File types
- 5. Variables and Keywords
- 6. Arithmetic Operations on Scalars
- 7. Order by Precedence

B) CONTROL STRUCTURES

- 8. If, If — Else If
- 9. While
- 10. For
- 11. Switch

C) MATRICES

- 12. Generation of Row/Column Vector
- 13. Generation of 2 Dimensional/Multidimensional Matrix
- 14. Arithmetic Operation on Arrays
- 15. Determination of Eigen Vector and Eigen Values of a Matrix

16. Determination of Rank of the Matrix
- D) GRAPHICS**
 17. 2D Plot
 18. 3D Plot
 19. Mesh Plot and Surface Plots
 20. Plotting of Wave Forms: Triangle, Square and Sine.
- E) POLYNOMIALS**
 21. Determination of Roots of a Polynomial Equation
 22. Arithmetic Operations on Polynomials
 23. Least Square Curve Fitting
 24. Interpolation
- F) ALGEBRA, DIFFERENTIATION AND INTEGRATION**
 25. Determine the Solution of Linear and Non-Linear Equation
 26. Determine the Solution for the First-Order and Higher-Order Differential Equations
 27. Determine the Solution for Single Variable and Two Variable Integration
 28. Determine the Summation of Infinite and Finite Series
- G) SIMULINK**
 29. Basics of Simulink
 30. Simulink Model to Solve an Equation
 31. Simulink Model to Solve Support Reaction of a Beam
- H) SOLVING ENGINEERING PROBLEMS USING MATLAB**
 32. Centroid
 33. Support Reaction of a Beam
 34. Projectile
- I) DEMONSTRATION ON TOOLBOXES FOR SPECIFIC CIVIL ENGINEERING APPLICATIONS**

TEXT BOOKS:

1. Raj Kumar Bansal, Ashok Goel, Manoj Kumar Sharma, "MATLAB and its Applications in Engineering", Pearson Education, 2012.
2. Rudra Pratap, "Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers", Oxford University Press, New York, 2010.

REFERENCE BOOKS:

1. Amos Gilat, "MATLAB-An Introduction with Applications", Wiley India.
2. Stephen J. Chapman, "Programming in MATLAB for Engineers", Cengage Learning, 2011.
3. Math Works Tool Boxes,
<http://in.mathworks.com/support/documentation>.

III B.Tech. – II Semester (16BT60241) **ENERGY AUDIT AND CONSERVATION**

(Interdisciplinary Elective –2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Principles of energy audit and conservation; Energy efficiency in buildings; Energy efficient motors, lighting, instruments and significance of energy economics.

COURSE OUTCOMES: On successful completion of this course, the students will be able to

- CO1. Demonstrate knowledge on auditing practices, conservation measures and economics of energy.
- CO2. Analyze auditing practices, conservation measures and economics of energy.
- CO3. Design an appropriate energy conservation measures in commercial and industrial applications.
- CO4. Provide feasible solutions for problems associated with energy auditing and conversion through proper investigation and interpretation of data.
- CO5. Use appropriate techniques for energy auditing and conservation.
- CO6. Solve energy auditing and conservation problems with societal relevance.
- CO7. Consider environment and sustainability in energy auditing and conservation.
- CO8. Follow relevant rules and regulations in practicing energy audit and conservation.
- CO9. Communicate effectively on energy audit in written and graphical forms.
- CO10. Consider financial issues in energy audit and conservation.

DETAILED SYLLABUS:

UNIT-I: ENERGY AUDIT PRINCIPLES (09 Periods)

Energy audit-Definitions, Concept, Types of audit, Energy index, Cost index, Pie charts, Sankey diagrams; Load profiles, Energy audit of industries, Energy saving potential, Energy audit of process industry, Building energy audit, IE rules and regulations for energy audit.

UNIT-II: ENERGY CONSERVATION PRINCIPLES (09 Periods)

Rules for efficient energy conservation, Technologies for energy conservation, Energy scenario, Principles of energy conservation, Resource availability, Energy savings, Current energy consumption in India, Roles and responsibilities of energy managers in industries.

UNIT-III:ENERGYEFFICIENCYINBUILDINGS	(11Periods)
Introduction, Definition and concepts, Energy and water as a resource- Heating, Ventilating and Air conditioning systems; Energy economic analysis, Domestic energy consumption, Savings, Energy use in buildings, Residential and commercial buildings, Green buildings, Smart buildings, Rating of buildings, Efficient use of buildings, Solar passive architecture, Eco-housing concepts.	
UNIT-IV:ENERGYAUDITINSTRUMENTSANDENERGYEFFICIENT	
MOTORS	(08Periods)
Energy Audit Instruments: Wattmeter, Dataloggers, Thermocouples, Pyrometers, Luxmeters, Tongue testers, PLCs and applications.	
Energy Efficient Motors: Factors affecting efficiency, Loss distribution, Constructional details, Characteristics, Variable speed, Variable duty cycle systems, Application of life cycle costing analysis, Return on investment.	
UNIT - V: ECONOMIC ASPECTS AND ANALYSIS	(08 Periods)
Economic concepts, Computation of economic aspects calculation of simple payback method, Net present worth method, Depreciation Methods, Time value of money, Rate of return, Present worth method, Replacement analysis, Life cycle costing analysis.	

Total Periods: 45

REFERENCE BOOKS:

1. AshokV.Desai, WileyEastern, *EnergyDemand–Analysis, ManagementandConservationHandBookonEnergyAuditing-TERI* (TataEnergyResearchInstitute), 2005.
2. AlbertThumann, WilliamJ. Younger, *HandbookofEnergyAudits*, Taylor&FrancisLtd, 7thEdition, 2008.
3. AshokV.Desai, WileyEastern, *EnergyDemand–Analysis, ManagementandConservationHandBookonEnergyAuditing-TERI* (TataEnergyResearchInstitute), 2005.
4. DaleR. Patrick, StephenW. Fardo, RayE. Richardson, Steven R. Patrick, *EnergyConservationGuideBook*, Taylor&Francis Ltd, 2ndEdition, 2007.
5. AshokV.Desai, *EnergyEconomics*, WileyEastern, 1stEdition, 1990.
6. *IndustrialEnergyConservationManuals*, Cambridge, MITPress, 1982.
7. FrankKreith, RonaldE. West, *HandbookofEnergyEfficiency*, CRC Press, 1st Edition, 1996.
8. *EnergyEfficiencyInBuildings*, CIBSEGuideF, 3rdEdition, May, 2012.
9. NileshY.Jadhav, *GreenandSmartBuildings:Advanced Technology Options*, Springer Science Business Media, Singapore, 2016.

III B.Tech. – I Semester (16BT5HS02) COSTING AND FINANCE MANAGEMENT FOR CIVIL ENGINEERS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: -

COURSE DESCRIPTION: Cost Planning; Contract Costing; Budgeting; Capital Budgeting; Estimation of Cash Flows; Working Capital Management.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Acquire knowledge in
 - a) The basic concepts of finance
 - b) Basic principles of costing
 - c) Provides skills for effective utilization of costing concepts for quoting tenders
 - d) Framing budgets in relation to construction
- CO2. Develop skills in analyzing problems for
 - a) Quoting tenders in relation to civil engineering
 - b) Budgeting finance for construction industry
 - c) Enhancing ability in calculating working capital requirement
 - d) Improvising ability in estimating cash flows
- CO3. Design solutions for effective decisions in investment
- CO4. Develop effective communication in relation to costing and finance
- CO5. Manage Finances for Civil Engineering Projects

DETAILED SYLLABUS:

UNIT-I: COST PLANNING (09 Periods)

Cost predication and estimating in civil engineering projects – Approximate estimating – Preliminary estimating – Detailed estimating – Cost plan inclusions

UNIT-II: CONTRACT COSTING (10 Periods)

Meaning – Definition – Simple Contract Accounts – Comparative Contract Accounts – Contract Accounts with Balance Sheet – Estimation of Contracts (Simple problems)

UNIT-III: BUDGETING (08 Periods)

Concept of Budget – Classification of Budgets – Considerations in preparing Budgets – Concept of Budgetary Control – Objectives and benefits of Budgetary Control – Essentials of a good Budgetary Control

UNIT-IV: CAPITAL BUDGETING**(10 Periods)**

Introduction – Nature of Capital Budgeting – Types of Capital Budgeting Decisions – Investment Evaluation Criteria – NPV – IRR – PI (simple problems)

Estimation of Cash Flows: Introduction – Cash Flows – Incremental Cash Flows – Capital and Depreciation for tax purpose

UNIT-V: WORKING CAPITAL MANAGEMENT**(08 Periods)**

Introduction – Concepts of Working Capital – Operating Cycle and Cash Conversion Cycle – Determination of Working Capital

– Sources of Working Capital Finance – Trade Credit – Accrued expenses and deferred income – Bank Finance for Working Capital

Total Periods: 45**TEXT BOOKS:**

1. S.P. Jain and K.L. Narang, *Cost Accounting*, Kalyani Publishers, Ludhiana, 12th Edition, 2008.
2. I.M. Pandey, *Financial Management*, Vikas Publishing House Pvt. Ltd., 11th Edition, 2015.

REFERENCE BOOKS:

1. The Institute of Company Secretaries of India, *Cost and Management Study Material*, New Delhi.
2. James C Van Horne and John M Wachowicz, *Fundamentals of Financial Management*, Prentice-Hall of India/Pearson, 13th Edition, 2009.

III B.Tech. – I Semester
(16BT50441) PRINCIPLES OF IMAGE
PROCESSING

(Interdisciplinary Elective -1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: - COURSE

DESCRIPTION:

Fundamentals of digital image processing; Image transforms; Image enhancement techniques in spatial and frequency domains; Restoration techniques & image segmentation techniques; Morphological operations; Representation and description; Pattern recognition.

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

- CO1. Demonstrate knowledge in
 - a. Image Fundamentals
 - b. Image Enhancement & Restoration Techniques
 - c. Image Segmentation Techniques
 - d. Morphological operations.
 - e. Representation and description
 - f. Pattern recognition
- CO2. Analyze different images using various processing techniques.
- CO3. Develop various image processing algorithms to process the images in various Real Time Applications.
- CO4. Solve problems related to images for feasible and optimal solutions in the core area of Image Processing.
- CO5. Apply appropriate techniques to restore degraded images in the field of image processing.
- CO6. Understand the impact of the image processing for societal needs.

DETAILED SYLLABUS:

UNIT - I: DIGITAL IMAGE FUNDAMENTALS (09 Periods)

Fundamental steps in digital image processing, image sampling & quantization, some basic relationships between pixels, arithmetic operations, logical operations, spatial operations.

Image Transforms: 2D-DFT and properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform.

UNIT-II: IMAGE ENHANCEMENT (09 Periods)

Basic intensity transformation functions, Histogram processing, Fundamentals of Spatial Filtering, Smoothing spatial filters, Sharpening spatial filters, Basics of filtering in frequency domain, Image smoothing using frequency domain filters, Image sharpening using frequency domain filters, Homomorphic filtering.

UNIT - III: IMAGE RESTORATION AND SEGMENTATION (09 Periods)

Image degradation/Restoration model, Estimating the degradation function, Inverse filtering, Wiener filtering, Constrained least squares filtering, Detection of discontinuities - Point, line and edge Detection; Thresholding - Global thresholding, Adaptive thresholding, Region based Segmentation.

UNIT -IV: MORPHOLOGICAL PROCESSING (09 Periods)

Preliminaries, Erosion and Dilation, opening and closing, Some basic morphological algorithms- boundary extraction, extraction of connected components, thinning, thickening, skeletons, pruning, morphological reconstruction; grayscale morphology- Erosion and Dilation, opening and closing, grayscale morphology algorithms.

UNIT - V: REPRESENTATION, DESCRIPTION AND RECOGNITION (09 Periods)

Chain codes, polygonal approximation, signatures, boundary segments, skeletons, boundary descriptors, regional descriptors, Pattern and pattern classes, recognition based on decision Theoretic methods- matching, optimum statistical classifiers.

Total Periods: 45

TEXT BOOKS:

1. Rafael C. Gonzalez and Richard E. Woods, *Digital Image Processing*, 3rd Edition, Pearson Education, 2008.
2. Anil K. Jain, *Fundamentals of Digital Image Processing*, Prentice Hall, 2007.

REFERENCE BOOKS:

2. William K. Pratt, *Digital Image Processing*, John Wiley & Sons Inc. 3rd Edition, 2001.
3. Earl Gose, Richard Johnsonbaugh, and Steve Jost, *Pattern Recognition and Image Analysis*, Pearson Education Services Pvt. Ltd, 2015.

IV B.Tech. - I Semester
(16BT70413) INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY
 (Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:--

COURSE DESCRIPTION:

Introduction to the concept of nano; Description of nanomaterial; Nanostructure characterization tools; Classification of nanomaterials; Fabrication of nanomaterial; Different applications of nanostructures and nanomaterials.

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

- CO1. Demonstrate knowledge in
 - Nanoscale technology.
 - Difference between micro and nanotechnology
 - Classification of Nanostructure and Nanomaterial
 - Fabrication of various nanomaterials and nanostructures.
- CO2. Analyze numerical and analytical problems in
 - Nanomaterial size by using Scanning Electron Microscope and X-Ray diffraction
- CO3. Design and fabricate devices based on nanostructures like
 - Nano solar cell
 - Nano cantilever
 - Nano bio-sensor
- CO4. Synthesize nano particle of different materials to solve the problems related to fabrication of nanostructures.
- CO5. Select appropriate technique for fabrication of nanostructures and Nano composites.
- CO6. Apply ethical standards and legal issues while using chemical substances in fabrication of new nanostructures.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTALS OF NANOTECHNOLOGY(08 Periods)

Introduction – Scientific revolutions, Time and length scale in structures, Definition of a nanosystem; Dimensionality and size dependent phenomena - Surface to volume ratio Fraction of surface atoms, Surface energy and surface stress, surface defects, Properties at nanoscale (optical, mechanical, electronic, and magnetic).

UNIT-II: IDENTIFICATION AND CHARACTERIZATION TOOLS FOR NANOMATERIALS AND NANOSTRUCTURE(10 Periods)

Field Emission Scanning Electron Microscopy (FESEM), Environmental Scanning Electron Microscopy (ESEM) High Resolution, Transmission Electron Microscope (HRTEM), Scanning Tunneling Microscope (STM), Surface enhanced Raman spectroscopy (SERS), Secondary Ion Mass Spectroscopy, Focused Ion Beam Photoelectron Spectroscopy, X-ray Photoelectron Spectroscopy (XPS), Auger electron spectroscopy (AES), Rutherford backscattering spectroscopy (RBS), X-Ray Diffraction, Intensities in X-Ray Scattering Particle Size Effect.

UNIT-III: CLASSIFICATION OF NANOMATERIALS(10 Periods)

Classification based on dimensionality, Quantum Dots, Wells and Wires-III-V Nanoparticles, Electronic Structure of Nanosemiconductor, Carbon based nanomaterials (buckyballs, nanotubes, graphene), Metal based nano materials (nanogold, nanosilver and metal oxides), Nanocomposites, Nanopolymers, Nanoglasses, Nano ceramics, Biological nanomaterials, Fulrene-discovery and early years,.

UNIT-IV: SOME FABRICATION TECHNIQUES OF NANOMATERIALS AND NANOSTRUCTURES(09 Periods)

Chemical Methods: Metal Nanocrystals by Reduction, Solvothermal Synthesis, Photochemical Synthesis, Sonochemical Routes, Chemical Vapor Deposition (CVD), Metal Oxide Chemical Vapor Deposition (MOCVD), Plasma Enhanced Chemical Vapour Deposition Technique(PECVD), Hydrothermal Method, Sol-Gel.

Physical Methods: Ball Milling, Electrodeposition, Spray Pyrolysis, Flame Pyrolysis, DC/RF Magnetron Sputtering, Molecular Beam Epitaxy (MBE) Thermal Evaporation Method.

UNIT-V:APPLICATIONS (08 Periods)

Solar energy harvesting, Catalysis, Molecular electronics and printed electronics Nanoelectronics, Polymers with aspecial architecture, Liquid crystalline systems, Linear and nonlinear optical and electro-optical properties, Applications in displays and other devices, Nanomaterials for data storage, Photonics, Plasmonics, Chemical and biosensors, Nanomedicine and Nanobiotechnology, MESFET.

Total Periods: 45

TEXT BOOKS:

1. Pradeep T., *A Textbook of Nanoscience and Nanotechnology*, Tata McGraw Hill Education Pvt. Ltd., 2012.
2. Hari Singh Nalwa, *Nanostructured Materials and Nanotechnology*, Academic Press, 2002.

REFERENCE BOOKS:

1. Nabok A., *Organic and Inorganic Nanostructures*, Artech House, 2005.
2. Dupas C., Houdy P., Lahmani M, *Nanoscience: Nanotechnologies and Nanophysics*, Springer - Verlag Berlin Heidelberg, 2007.
3. S.M. Sze, *Physics of Semiconductor Devices*, 2nd Edition, 2001.

III B. Tech. – II Semester
(16BT60310) MANAGING INNOVATION AND
ENTREPRENEURSHIP

(Common to CE, ME, CSE, IT & CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts of Shifting Composition of the Economy Purposeful Innovation & Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.

COURSE OUTCOMES: On successful completion of this course, the student will be able to:

- CO1. Demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures.
- CO2. Analyze business plans for potential investors and stakeholders and effectively answer probabilistic questions on the substance of plan.
- CO3. Develop a comprehensive and well planned business structure for a new venture.
- CO4. Conduct investigation on complex problems, towards the development of Project.
- CO5. Apply modern statistical and mathematical tools to design projects and subsequent work procedures.
- CO6. Apply ethics in constructive innovation framework.
- CO7. Exhibit professionalism by employing modern project management and financial tools.

DETAILED SYLLABUS:

UNIT - I: Creativity and Innovation (07 Periods)

Introduction, Levels of innovation, Purposeful innovation and the sources of innovative opportunity, The innovation process, Innovative strategies, Strategies that aim at introducing and innovation, Dynamics of ideation and creativity – Inbound, Outbound; Context and process of new product development, Theories of outsourcing.

UNIT - II: Paradigms of Innovation (11 Periods)

Systems approach to innovation, Innovation in the context of developed economies and Emerging economies, Examining reverse innovation and its application, Performance gap, Infrastructure gap, Sustainability gap, Regulatory gap, Preference gap, organizational factors effecting innovation at firm level.

UNIT - III: Sources of finance and venture capital (07 Periods)

Importance of finance, Comparison of venture capital with conventional development capital, Strategies of venture funding, Investment phases, Investment process, Advantages and disadvantages of venture capital, Venture capital developments in India.

UNIT - IV: Intellectual property innovation and Entrepreneurship (11 Periods)

Introduction to Entrepreneurship, Evolution of entrepreneurship from economic theory, Managerial and entrepreneurial competencies, Entrepreneurial growth and development, Concepts, Ethics and Nature of International Entrepreneurship, Intellectual property – forms of IP, Patents, Trademarks, Design registration, Copy rights, Geographical indications, Patent process in India.

UNIT - V: Open Innovation framework & Problem solving (09 Periods)

Concept of open innovation approach, Difference between open innovations and Cloud innovation approaches, Limitations and

Opportunities of open innovation framework, Global context of strategic alliance, Role of strategic alliance, Problem Identification and Problem Solving, Innovation and Diversification.

Total Periods: 45

TEXT BOOKS:

1. Vinnie Jauhari, Sudhanshu Bhushan, *Innovation Management*, Oxford University Press, 1st Edition, 2014.
2. Drucker, P. F., *Innovation and Entrepreneurship*, Taylor & Francis, 2nd Edition, 2007.

REFERENCE BOOKS:

1. Robert D Hisrich, Claudine Kearney, *Managing Innovation and Entrepreneurship*, Sage Publications, 1st Edition, 2014.
2. V.K.Narayanan, *Managing Technology and Innovation for Competitive Advantage*, Pearson India, 1st Edition, 2002.

III B.Tech - II Semester
14BT60308:MANAGING INNOVATION AND
ENTREPRENEURSHIP

(OPEN ELECTIVE)

(Common to CSE, IT, CSSE, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Nil

Course Description:

Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts Shifting Composition of the Economy Purposeful Innovation & 7 Sources of Innovative Opportunity The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.

Course Outcomes:

After completion of this course, a successful student will be able to:

- CO1:** Define, explain and illustrate theories of business innovation and entrepreneurship, the evolution of industries and economies, and the roles of Entrepreneurs.
- CO2:** Develop a comprehensive and well structured business plan for a new venture.
- CO3:** Present a persuasive business plan to potential investors or to internal stakeholders and effectively answer probing questions on the substance of the plan; and,
- CO4:** Work effectively in multidisciplinary, cross-cultural teams, towards the development of a Team Project.

Unit-I: ENTREPRENEURSHIP

(7 Periods)

Introduction to Entrepreneurship: Evolution of entrepreneurship from economic theory; Managerial and entrepreneurial competencies, entrepreneurial growth and development.

UNIT II: CREATIVITY AND INNOVATION

(11Periods)

Creativity and Innovation: Concepts Shifting Composition of the Economy; Purposeful Innovation & the 7 Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies: Strategies that aim at introducing an innovation, innovation & entrepreneurship, planning -incompatible with Innovation & entrepreneurship.

Unit-III: THE INDIVIDUAL ENTREPRENEUR

(7 Periods)

Entrepreneurial Motivation: Need for continuous learning & relearning; Acquiring Technological Innovation Entrepreneurial motivation (nach story); Achievement Motivation in Real life- Case Study. Entrepreneurs versus inventors

**Unit-IV: INTERNATIONAL ENTREPRENEURSHIP OPPORTUNITIES
(11 Periods)**

International Entrepreneurship: Concepts and Nature of International Entrepreneurship. The changing International environment. Ethics and International Entrepreneurship. Entrepreneurial entry in to international business, strategic Issues in International Entrepreneurship.

Unit-V: Creative Problem Solving (9 Periods)

Problem Identification and Problem Solving: Problem Identification. Problem solving Innovation and Diversification.

Total Periods: 45

TEXT BOOKS:

- 1: Martin, M.J. "Managing Innovation and Entrepreneurship in Technology based Firm", John Wiley Interscience, 1994.
- 2: Ettlie, J.E. "Managing Technology Innovation", John Wiley & Sons, 2000.
- 3: Robert D Hisrich., Michael P Peters., Dean A Shepherd, "Entrepreneurship" The McGraw-Hill Companies, 6th Edition, 2011

REFERENCE BOOKS:

- 1: Christensen, C. M. and Raynor, M. E. The Innovators Solution: Creating and Sustaining Successful Growth, Boston, MA: Harvard Business School Press, (2003).
- 2: Drucker, P. F., Innovation and Entrepreneurship, New York: Harper, 1985.
- 3: Harvard Business Review on Innovation (Collection of articles), Harvard Business School Press (2001).
- 4: Harvard Business Review on Entrepreneurship (Collection of articles), Harvard Business School Press (1999)
- 5: Rogers, E.M., "Diffusion of Innovations", New York: Simon and Schuster, 5th Edition, 2003.
- 6: Drucker, P. F. "The Discipline of Innovation," Harvard Business Review, May2000. (Originally published 1985, May-June)