DR. A.P.J ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW

STUDY & EVALUATION SCHEME B.TECH. ENVIRONMENTAL ENGINEERING

SECOND YEAR III- SEMESTER

WITH EFFECT SESSION 2017-18

S. No.	Subject Code	Subject Name	L-T-P	Th/Lab Marks	Sessional		Total	Credit
					Test	Assig/Att.		
1		Math-III / Science Based Open Elective	3---1---0	70	20	10	100	4
2		Human Value & Professional Ethics / ENV. & Ecology	3---0---0	70	20	10	100	3
3	RME	Mechanics of Solids	3---0---0	70	20	10	100	3
4	REV301	Environmental Engineering Principles and Process	3---0---0	70	20	10	100	3
5	REV302	Environmental Chemistry and Microbiology	3---0---0	70	20	10	100	3
6	REV303	Fluid Mechanics and Hydraulics	3---1---0	70	20	10	100	4
7	REV351	Environmental Sampling and Analysis Lab	0---0---2	50	30	20	100	1
8	REV352	Microbiology Lab	0---0---2	50	30	20	100	1
9	REV353	Fluid Mechanics Lab	0---0---2	50	30	20	100	1
10	REV354	Environmental Hydraulics Lab	0---0---2	50	30	20	100	1
	TOTAL						**1000**	**24**

Science Based Open Electives

ROE030/ROE040	Manufacturing Process
ROE031/ROE041	Introduction to soft computing
ROE032/ROE042	Nano Sciences
ROE033/ROE043	Laser Systems and Applications
ROE034/ROE044	Space Sciences
ROE035/ROE045	Polymer Science & Technology
ROE036/ROE046	Nuclear Science
ROE037/ROE047	Material Science
ROE038/ROE048	Discrete Mathematics
ROE039/ROE049	Applied Linear Algebra

DR. A.P.J ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW

STUDY & EVALUATION SCHEME B.TECH. ENVIRONMENTAL ENGINEERING

SECOND YEAR IV- SEMESTER

WITH EFFECT SESSION 2017-18

S. No.	Subject Code	Subject Name	L-T-P	Th/Lab Marks	Sessional		Total	Credit
					Test	Assig/Att.		
1		Science Based Open Elective /Math-III	3---1---0	70	20	10	100	4
2		ENV & Ecology/ Human Value & Professional Ethics	3---0---0	70	20	10	100	3
3	RCE402	Geoinformatics	3---0---0	70	20	10	100	3
4	REV401	Water Supply and Treatment Engineering	3---0---0	70	20	10	100	3
5	REV402	Health Safety and Environment	3---0---0	70	20	10	100	3
6	REV403	Structural Analysis	3---1---0	70	20	10	100	4
7	REV451	Remote Sensing & GIS Lab	0---0---2	50	30	20	100	1
8	REV452	Water Supply & Treatment Lab	0---0---2	50	30	20	100	1
9	REV453	CAD Lab-1	0---0---2	50	30	20	100	1
10	REV454	Material Testing Lab	0---0---2	50	30	20	100	1
	TOTAL						**1000**	**24**

Science Based Open Electives

ROE030/ROE040	Manufacturing Process
ROE031/ROE041	Introduction to soft computing
ROE032/ROE042	Nano Sciences
ROE033/ROE043	Laser Systems and Applications
ROE034/ROE044	Space Sciences
ROE035/ROE045	Polymer Science & Technology
ROE036/ROE046	Nuclear Science
ROE037/ROE047	Material Science
ROE038/ROE048	Discrete Mathematics
ROE039/ROE049	Applied Linear Algebra

Detailed Syllabus of 2nd Year B.Tech. Environmental Engg. w.e.f. 2017-18

IIIrd Semester

Environmental Engineering Principles and Processes (REV301)

L T P
3 0 0

Unit I
Classification of Pollutants, pollutants in water and wastewater – characteristics, Standards for performance, Significance of physico-chemical treatment, types of reactor, reactor selection, batch-continuous type-kinetics. **[8]**

Unit II
Physical Treatment Principles, Principles of Screening, Mixing, Equalization, Sedimentation, Filtration – Modeling, back washing, Evaporation, Incineration, gas transfer, Adsorption – Isotherms, regeneration, membrane separation, Reverse Osmosis, nano filtration, ultra filtration and hyper filtration electrodialysis, distillation, stripping and crystallization. **[8]**

Unit III
Chemical Treatment Principles, Enzymes and factors influencing enzymic reactions, Principles of Chemical treatment – Coagulation, flocculation, Precipitation, flotation solidification and stabilization, Disinfection, Ion exchange, Solvent extraction, advanced oxidation /reduction **[8]**

Unit IV
Biological Treatment Principles, biomonitoring methods – Eutrophication, Objectives of biological treatment – significance , aerobic and anaerobic treatment, kinetics of biological growth, Factors affecting growth – attached and suspended growth, Determination of Kinetic coefficients for organics removal , Biodegradability assessment, selection of process reactors, batch-continuous type-kinetics, Biological treatment of wastewater – bacterial reductions, Algae in water supply systems – problems and control. **[8]**

Unit V
Sludge Treatment and Disposal, design of sludge management facilities, sludge thickening, sludge digestion, biogas generation, sludge dewatering (mechanical and gravity) Layout PID hydraulics profile, upgrading existing plants, ultimate residue disposal. **[8]**

References:
1. Peavy, Howard S., Rowe, Donald R and Tchobanoglous, George, "Environmental Engineering" McGraw Hill Education (India) Pvt. Ltd., New Delhi.
2. Nathanson, Schneider, "Basic Environmental Technology: Water Supply, Waste Management & Pollution Control" 6/e, Pearson Education
3. Sincero/Sincero, "Environmental Engineering: A Design Approach" Pearson Education
4. Metcalf & Eddy "Wastewater Engineering: Treatment & Reuse", Tata Mc-Graw Hill.
5. Garg, S.K.: Water Supply Engineering (Environmental Engineering Vol. – I)

6. Garg, S.K.: Sewage Disposal and Air Pollution Engineering (Environmental Engineering Vol.–II).
7. Seinfeld, J.H. and Pandis, S.N. "Atmospheric Chemistry and Physics: From Air Pollution to Climate Change", John Wiley
8. http://cpcb.nic.in/, National ambient air quality standards, Central Pollution Control Board, Ministry of Environment and Forest, Government of India.
9. Qasim, S.R., Motley, E.M. and Zhu.G. Water works Engineering – Planning, Design and Operation, Prentice Hall, New Delhi, 2002.
10. Lee, C.C. and Shun dar Lin, Handbook of Environmental Engineering Calculations, Mc Graw Hill, New York, 1999.
11. Hendricks, D. 'Water Treatment Unit Processes – Physical and Chemical' CRC Press, New York 2006

Environmental Chemistry and Microbiology (REV302)

L T P
3 0 0

Unit I

Introduction to environmental chemistry-concept and scope of environmental chemistry, components of environment, structure and composition of atmosphere, natural cycles of matter in the environment.

Introduction to microbiology: Concept and scope of microbiology, kinds of microorganisms, major characteristics and the role of microorganisms, interaction between biological and chemical components. **[8]**

Unit II

Chemistry of water and waste water-Hydrological cycle, principles of equilibrium chemistry, pH, oxidation - reduction and the applications of principles of chemistry for solving Environmental Engineering Problems, Colloidal Chemistry, catalysis and Photo catalysis, Corrosion and its control **[8]**

Unit III

Chemistry of the air environment- combustion related air pollution, global environmental problems - chemistry of CFC, ozone depletion, greenhouse effect, acid rain, La Nino etc. Chemistry of pollution due to detergents, pesticides, polymers, trace organics, metals, petroleum and radioactive compounds. **[8]**

Unit IV

Environmental Microbiology-Basic principles of microbial transformation of organic matter, microbial inhibition mechanisms, Structure and function of cell constituents, biomass – classification, nutrients and microorganisms – environmental factors, Indicator organisms, - coliforms – MPN index, M.F. technique. **[8]**

Unit V

Pure and mixed cultures, Aerobic and anaerobic metabolism, microbial growth and dynamics, Microbial taxonomy, classification and morphological aspects of bacteria, fungi, protozoa, algae and other higher aquatic life forms, Bioassay tests for toxicity evaluation, Role of microorganisms in water and waste water engineering, Microbiology applied to air pollution control (Bio scrubbers and bio-filters). **[8]**

References:

1. A.K. De: Environmental Chemistry
2. Benefield, L.D, Judkins, J.F and Weand, B.L Process Chemistry for Water and Waste water treatment, Prientice-Hall, Inc. Eaglewood Cliffs, New Jersey, 1982.
3. Krueger and Johansson: Microbiology
4. Larinzar – General Biochemistry
5. Manahan: Environmental Chemistry
6. McKinney: Microbiology for Sanitary Engineers
7. Pelczar, Chan, and Krieg: General Microbiology
8. Pelczar, M.J., Chan E.C.S. and Krieg, N.R. Microbiology, Tata McGraw Hill, New Delhi, 1993.
9. Sawyer, C.N., McCarty, P.L. and Parkin, G.F., Chemistry for Environmental Engineering, Tata McGraw-Hill, New Delhi, 2003.
10. Sawyer, McCarty, and Parkin: Chemistry for Environmental Engineering
11. Sharma: Microbiology
12. Tortora, Funke and Case: Microbiology Pearson Education
13. Marquita K. Hill, "Understanding Environmental Pollution" 3/e, Cambridge University Press

Fluid Mechanics & Hydraulics (REV303)

L T P
3 1 0

Unit - I

Fluid and continuum, Physical properties of fluids, Rheology of fluids.
Pressure-density-height relationship, manometers, pressure transducers, pressure on plane and curved surfaces, centre of pressure, buoyancy, stability of immersed and floating bodies, fluid masses subjected to linear acceleration and uniform rotation about an axis. **[8]**

Unit - II

Types of fluid flows: Continuum & free molecular flows. Steady and unsteady, uniform and nonuniform, laminar and turbulent flows, rotational and irrotational flows, compressible and incompressible flows, subsonic, sonic and supersonic flows, sub-critical, critical and supercritical flows, one, two and three dimensional flows, streamlines, continuity equation for 3D and 1D flows.

Dimensional analysis, Buckingham's Pi theorem, important dimensionless numbers and their significance. **[8]**

Unit - III

Equation of motion along a streamline and its integration, Bernoulli's equation and its applications- Pitot tube, orifice meter, venturi meter and bend meter, Hot-wire anemometer and LDA, notches and weirs, momentum equation and its application to pipe bends. resistance to flow, minor losses, pipe in series and parallel, power transmission through a pipe, siphon, water hammer, three reservoir problems and pipe networks. **[8]**

Unit - IV

Difference between open channel flow and pipe flow, Geometrical parameters of a channel, Continuity equation for steady and unsteady flow, Critical depth, Specific energy. **[8]**

Unit – V

Chezy's and manning's equations for uniform flow in open channel, Velocity distribution, Most efficient channel section, Compound channels.

Application of specific energy principle for interpretation of open channel phenomena, Flow through vertical and horizontal contractions. **[8]**

References :

1. Hibbler, "Fluid Mechanicsin SI Units" 1/e Pearson Education, Noida.
2. Fox & Donald, "Introduction to Fluid Mechanics" John Wiley &Sons Pvt Ltd,
3. Cengel & Cimbala, "Fluid Mechanics" TMH, New Delhi.
4. Katz, "Introductory Fluid Mechanics" Cambridge University Press
5. Pnueli & Gutfinger, "Fluid Mechanics" Cambridge University Press
6. Modi & Seth "Hydraulics & Fluid Mechanics" Standard Publications.
7. Gupta, "Fluid Mechanics & Hydraulic Machines" Pearson Education, Noida
8. Graebel, "Engineering Fluid Mechanics", CRC Press Taylor & Francis Group.
9. Janna, "Introduction to Fluid Mechanics" 4/e, CRC Press Taylor & Francis Group.
10. AK Jain "Fluid Mechanics" Khanna Publication.
11. White,F.M. "Fluid Mechanics" TMH, New Delhi.
12. Munsen et al , "Fundamental of Fluid Mechanics" Wiley Newyork Ltd
13. Garde, R.J., " Fluid Mechanics", SciTech Publications Pvt. Ltd
14. I.H. Shames, "Mechanics of Fluids", McGraw Hill, Int. Student.
15. RK Bansal "Fluid Mechanics and Hydraulic Machines" Laxmi Publication
16. Jagdish Lal "Fluid Mechanics"
17. N Narayan Pillai " Principles of Fluid Mechanics & Fluid Machines" Universities Press.
18. Esposito, Fluid Power & Applications" 7/e Pearson Education, Noida.
19. D.R. Malhotra & Malhotra, "Fluid Mechanics Hydraulics & Hydraulic Machines" Satya Prakashan, New Delhi.

Environmental Sampling and Analysis Lab (REV351)

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- Collection of grab and composite sample from a water/ wastewater stream.
- Flow measurement in a wastewater drain in field.
- Determination of moisture content and pH of soil.
- Digestion of samples for metal analysis.
- Determination of Na and K by flame photometer.
- Vehicle counting and classification on a highway.
- Measurement of noise.
- Determination of metals in samples.
- Study of chromatography.

Microbiology Lab (REV352)

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1. Use of microscope: Bacterial morphology and staining methods.
2. Biological examination of water: Algae, bacteria and Protozoa.
3. Quantitative plating method.
4. Bacterial water quality: Measuring quality of water by using coli form organisms (MPN method and membrane filter).
5. Indicator and Indices: Fecal streptococci, anaerobic bacteria
6. Estimation of sugars, proteins, lipids.
7. Biochemical activities of bacteria: hydrolysis of polysaccharides,
8. Determination of Biodiversity index.

Reference:
Sirockin and Cullimore: Practical Microbiology

Fluid Mechanics Lab (REV353)

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Note: Ensure to conduct at least 10 experiments from the list:

1. To verify the momentum equation using the experimental set-up on impact of jet.
2. To determine the coefficient of discharge of an orifice of a given shape. Also to determine the coefficient of velocity and the coefficient of contraction of the orifice mouth piece.
3. To calibrate an orifice meter and study the variation of the co-efficient of discharge with the Reynolds number.
4. To calibrate a Venturimeter and study the variation of the co-efficient of discharge with the Reynolds number.
5. To calibrate a bend meter and study the variation of the co-efficient of discharge with the Reynolds number.
6. To draw a flow-net using Electrical Analogy Method.
7. To study the transition from laminar to turbulent flow and to determine the lower critical Reynolds number.
8. To study the velocity distribution in a pipe and also to compute the discharge by integrating the velocity profile.
9. To study the variation of friction factor, 'f' for turbulent flow in commercial pipes.
10. To study the boundary layer velocity profile over a flat plate and to determine the boundary layer thickness.
11. To determine Meta-centric height of a given ship model.
12. To determine the head loss for a sudden enlargement
13. To determine the head loss for a sudden Contraction.

Environmental Hydraulics Lab (REV354)

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Note: Any 8 experiments from the list:

1. To determine the Manning's coefficient of roughness 'n' for the bed of a given flume.

2. To study the velocity distribution in an open channel and to determine the energy

and momentum correction factors.

3. To study the flow characteristics over a hump placed in an open channel.

4. To study the flow through a horizontal contraction in a rectangular channel.

To calibrate a broad-crested weir.

6. To study the characteristics of free hydraulic jump.

7. To study centrifugal pump and their characteristics.

8. To study the free overfall phenomenon in an open channel and to determine the end depth.

9. To determine coefficient of discharge for given rectangular notch.

10. To determine coefficient of disc.

Detailed Syllabus of 2nd Year B.Tech. Environmental Engg. w.e.f. 2017-18

IV Semester

Geoinformatics (RCE402)

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Unit I: **[8]**

Photogrammetric Survey, basic principles, elevation of a point, determination of focal length of lens, aerial camera, scale of a vertical photograph, relief displacement of a vertical photograph, height of object from relief displacement, scale of a tilted photograph, tilt distortion, relief displacement of a tilted photograph, combined effects of tilt and relief, flight planning for aerial photography, selection of altitude, interval between exposures, crab and drift, stereoscope parallax, parallax in aerial stereoscopic views, parallax equations. Photogrammetry – analog, analytical and digital photogrammetry.

Unit II: **[8]**

Remote Sensing, Introduction, concepts and physical basis of Remote Sensing, Electromagnetic spectrum, radiation laws, atmospheric effects, image characteristics. Remote sensing systems; sources of remote sensing information, spectral quantities spectral signatures and characteristics spectral reflectance curves for rocks, soil, vegetation and water. Introduction to Aerial and space borne platforms. Optical, thermal and microwave sensors and their resolution, salient features of some of operating Remote Sensing satellites.

Unit III: **[8]**

Digital image processing: introduction, image rectification and restoration, image enhancement, image transformation, manipulation, image classification, fusion. Applications of remote sensing to civil engineering.

Unit IV: **[8]**

GIS system : Definition terminology and data types, basic components of GIS software, data models, data acquisition, both raster based and vector based data input and data processing and management including topology, overlaying and integration and finally data product and report generation. GIS applications in civil engineering.

Unit V: **[8]**

Global Navigation Satellite System (GNSS), GPS, GLONASS, GALILEO, GPS: Space segment, Control segment, User segment, GPS satellite signals, Datum, coordinate system and map projection, Static, Kinematic and Differential GPS, GPS Applications.

REFERENCE

1. Sateesh Gopi, R Sathkumar & N Madhu “Advanced Surveying GIS & Remote

Sensing" Pearson Education.
2. Kang Tshung Chang "Introduction of Geographic Information Systems" TMH.
3. Campbell, "Introduction to Remote Sensing" 3/e, CRC Press Taylor & Francis Group.
4. Chen, "Signal and Image Processing for Remote Sensing" CRC Press Taylor & Francis Group.
5. A M Chandra: Higher Surveying Narosa Pub.
6. B C Punamia: Higher Surveying Laxmi Publication
7. T M Lillesand et al: Remote Sensing & Image Interpretation
8. R. Agor, "Advanced Surveying" Khanna Publishers.
9. B. Bhatta: Remote Sensing & GIS TMH.
10. M Anjireddy: Remote Sensing & GIS, BS Publications
11. Narayan Panigrahi "Geographical Information Science" Universities Press.
12. N K Agarwal: Essentials of GPS, Spatial Networks: Hyderabad.
13. George Joseph "Fundamental of Remote Sensing" Universities press.
14. GS Srivastava "An Introduction to Geoinformatics" TMH.
15. Ahmed EI Rabbany, "Introduction to GPS The Global Positioning System" Artech House, Boston.
16. Chor Pang Lo, "Concepts & Techniques of Geographic Information Systems" 2/e, Pearson Education, Noida.

Water Supply and Treatment Engineering (REV401)

L T P
3 0 0

Unit-I
Characteristics of water: Physical, chemical and biological standards. Theory, Operation and design of aeration system, sedimentation, coagulation, and clariflocculation. Design of clariflocculator **[8]**

Unit-II
Filtration: Slow and rapid gravity filter, multi-media filters and pressure filters. Design of slow sand filter and rapid sand filter. Disinfection: theory and application of chlorine. Miscellaneous methods of water treatment- removal of iron and manganese, hardness, fluorides, colour, taste and odour, dissolved metals and gases. **[8]**

Unit-III
Adsorption, ion-exchange, membrane processes. Operation and Maintenance of water treatment plants, Industrial water treatment. **[8]**

Unit-IV
Water Supply Engineering: Water demand, design period, population forecasting, sources of water; hydrological concepts, ground-water and its development. **[8]**

Unit-V
Conveyance of water; pipe materials, corrosion, laying of pipes, pipe appurtenances, pumps for water supply, distribution system, planning of water supply projects. Design of water distribution network. Rural water supply distribution system. **[8]**

References:

1. Hammer & Hammer, " Water & Waste water Technology" 7/e Pearson Education
2. Fair, and Geyer: Water and Wastewater Engineering, Vol-I and II, John Wiley and sons, New York.
3. Steel and McGhee: Water Supply and Sewerage.
4. Peavy, Rowe and Tchobanoglous: Environmental Engineering
5. Hammer and Hammer, Jr.: Water and Wastewater Technology.
6. Garg, SK: Water Supply Engineering (Environmental Engineering Vol.-I Khanna Publication
7. Raju: Water Supply and Wastewater Engineering
8. Kshirsagar: Water Supply and Treatment
9. Punmia: Water Supply and Wastewater Engineering
10. Birdie: Water Supply and Sanitary Engineering
11. Viessman, " Water Supply and Pollution Control" 8/e, Pearson Education

Health Safety and Environment (REV402)

L T P
3 0 0

Unit-I

Introduction : Types of hazards, analysis of hazards , precautions & preventions , grades of hazards , Safety methods, Safety measures . IS 18001:2000/ 9001:2000 ISO 14001:1996 Comparison, Importance of H.F& S, Industrial scope/Act/Compensation **[8]**

Unit-II

Fire hazards : Classification of fire , Grades of fire hazard . Classification of buildings / structures / materials ./ chemicals according to fire load . Fire hazard analysis , consequences & management. Mode of fire , fire fighting , Provision of buildings & Industrial structures from – fire safety angle . **[8]**

Unit-III

Different types of fire alarms / detectors & extinguishers , fire fighting requirements as per NBC 1983 / Municipality water supply requirements for fire , required fire flow , storage . wet risers, sprinkler , fire fighting services etc. **[8]**

Unit-IV

General discussion on toxicology. Physiological effects of various compounds , Classification of hazardous chemicals / conditions . Occupational health & safety concepts .Classes of Explosive **[8]**

Unit-V

Protection & prevention measures of accidents & hazards Transportation & storage of chemicals, leakage & accident prevention .Industrial risk & Disaster management Survey of two industries for disaster / safety control systems, Electrical Safety Programme pollution control Practices in pesticides Industries **[8]**

Reference

1.National Safety Council Publication
2.Environmental Chemistry by Stanley E. Manahan, VIth Ed. Lewis Publishers, London
3.CPCB Green Book
4.www.moef.gov.in
5. Rougier, Sparks & Hill, "Risk and Uncertainty Assessment for Natural Hazards" Cambridge University Press

Structural Analysis (REV403)

L T P
3 1 0

Unit I

Classification of Structures, Static and kinematic indeterminacy for beams, Trusses and building frames.

Deflection of determinate beams and simple frames using moment area, energy, unit load and conjugate beam method.

Maxwell's reciprocal and Betti's theorem, Castigliano's theorem. **[8]**

Unit II

Influence lines - concept, Muller-Breslau's principal and its applications for determinate and indeterminate beams.

Application of influence lines for absolute maximum bending moment and shear force for moving point loads, several loads, uniformly distributed loads on beam. **[8]**

Unit III

Types of arches, Analysis of three hinged arches, Expression for horizontal thrust of two hinged circular and parabolic arch. **[8]**

Unit IV

Concept of force and displacement approaches in analysis of indeterminate beams. Analysis of indeterminate beams and simple frame using consistent deformation, Slope deflection and moment distribution methods. **[8]**

Unit V

Flexibility and stiffness matrix for indeterminate beams and their application in analysis of indeterminate beams. **[8]**

References

1. Hibbler, "Structural Analysis", Pearson Education
2. Mau, "Introduction to Structural Analysis" CRC Press Taylor & Francis Group.
3. Ghali, "Structural Analysis: A Unified Classical and Matrix Approach" 5/e, CRC Press Taylor & Francis Group.
4. T S Thandavmorthy, "Analysis of Structures", Oxford University Press
5.Wilbur and Norris, "Elementary Structural Analysis", Tata McGraw Hill.
6. Temoshenko & Young "Theory of Structure" Tata Mc Grew Hill.
7. Reddy, C.S., "Basic Structural Analysis", Tata McGraw Hill.
8. Jain, O.P. and Jain, B.K., "Theory & Analysis of Structures ". Vol.I & II Nem Chand.
9. Vazirani & Ratwani et al , "Analysis of Structures" , Khanna Publisher s
10. Coates, R.C., Coutie, M.G. & Kong, F.K., "Structural Analysis", English Language Book Society & Nelson, 1980.
11. SP Gupta & Gupta "Theory of Structure Vol.1 & 2" TMH
12. DS Prakash Rao "Structural Analysis: A Unified Approach" Universities Press.

13. S Ramamurtham “Theory of Structure” Dhanpat Rai.
14. Devdas Menon “Advanced Structural Analysis” Narosa
15. Wang, C.K. “Intermediate Structural Analysis”, Tata Mc-Graw Hill.
16. Hsieh, “Elementary Theory of Structures” 4/e, Pearson Education, Noida.
17. Mckenzie, “Examples in Structural Analysis” 2/e, CRC Press Taylor & Francis Group.
18. Bibek Kumar Mukherjee, “Theory and Analysis of Structures” Satya Prakashan, New Delhi
19. Jacques Heyman, “Structural Analysis” Cambridge University Press.

Remote Sensing & GIS (REV451)

L T P
0 0 2

1. Demonstration and working on Electronic Total Station. Measurement of distances, horizontal & vertical angles and coordinates.
2. Measurement of area of a land parcel using Total Station.
3. To layout a precise traverse in a given area and to compute the adjusted coordinates of survey stations.
4. Demonstration and working with Mirror stereoscopes, Parallax bar and Aerial photographs.
5. Visual Interpretation of standard FCC (False colour composite).
6. Digitization of physical features on a map/image using GIS software.
7. Coordinates measurement using GPS.

Water Supply and Treatment Lab (REV452)

L T P
0 0 2

1. Sampling Techniques
2. Determination of pH, conductivity.
3. Determination of colour, turbidity.
4. Determination of total solids, total dissolved solids, total suspended solids and volatile solids.
5. Determination of hardness, chloride.
6. Determination of alkalinity, acidity.
7. Determination of iron, sulphate.
8. Determination of fluoride, nitrate.
9. Determination of sulphate.
10. Determination of fluoride.
11. Jar test for coagulation studies.
12. Application of laboratory and pilot plant scale units for evaluation of design criteria of:

a) Settling analysis studies.
b) Water treatment by slow sand filter / rapid gravity filter.

References:

1. Sawyer, McCarty and Parkin: Chemistry for Environmental Engineering
2. Mathur: Water and Wastewater Testing
3. Standard Methods for the Examination of Water and Wastewater, A.P.H.A., New York.

CAD Lab-1 (REV453)

L T P
0 0 2

1. Design of water distribution system using available software.
2. Design of sewer line/ wastewater drain network using available software.
3. Digitization of your city map using available software and showing pollution map.
4. Predicting concentration of air pollutant, emitted from stack, at any given location in ambient environment by using any dispersion modeling software.

Material Testing Lab (REV454)

LTP
002

Testing of various properties of following materials as per BIS specifications

I. Cement

1. Normal Consistency of cement.
2. Initial & final setting time of cement
3. Compressive strength of cement
4. Fineness of cement by air permeability and Le-chatalier's apparatus.
5. Soundness of cement.
6. Tensile strength

II. Coarse Aggregate

1. Water absorption of aggregate
2. Sieve Analysis of Aggregate
3. Specific gravity &bulk density
4. Grading of aggregates.

III Fine Aggregate:

1. Sieve analysis of sand
2. Silt content of sand
3. Bulking of sand

IV Bricks:

1. Water absorption.
2. Dimension Tolerances

3. Compressive strength
4. Efflorescence