



BHARATI VIDYAPEETH UNIVERSITY, Pune.

(Established under Section 3 of UGC ACT 1956)



COURSE STRUCTURE AND SYLLABUS

B. Tech. (CIVIL) (Sem. V & VI)



COURSE STRUCTURE & SYLLABUS

BHARATI VIDYAPEETH UNIVERSITY, PUNE

B. Tech. (CIVIL) (Sem. V & VI)



Bharati Vidyapeeth University College of Engineering (BVUCOE) is the largest Engineering College in Maharashtra with an intake of 700 students in each academic year. Imparting quality technical education from undergraduate to doctorate Level, BVUCOE is probably the only Engineering College in India with an accreditation from both NAAC as well as NBA. The faculty at BVUCOE boasts of highly qualified academicians, a quality that is further emphasized by the fact that 15 of them are presently pursuing their Ph.D. degree.

BVUCOE has been ranked 29th amongst the Top 50 Technical Schools of India in survey conducted by DATAQUEST-IDC. We have enjoyed a ranking in this list for the last 4 years. Research is of utmost importance in all our programs. A total of 113 research papers were published in 2007-2008.

Currently we have 12 ongoing research projects. The infrastructure of BVUCOE is state-of-the-art with 62 classrooms, 59 laboratories and a well-stocked library that currently holds 27,130 titles. The college has an international presence with MOUs signed with the North Carolina A&T State University (Greensboro, USA), University of Venice (Italy), Actel Corporation (USA). Corporate interaction is also inculcated in our programs through our association with Oracle India Ltd., Infosys Ltd. and Tata Consultancy Services.

SALIENT FEATURES

The Construction activity is the second largest economic activity in India next only to agriculture. The amount of money invested and the jobs provided by the Civil Engineering industry are much larger than any other industry. Overall globalization of the economy has resulted in more and more demand for better infrastructure facilities like roads, bridges, airports and project related to water resources. The Civil Engineer therefore has to play a major role in the development of the country. The Department of Civil Engineering desires its students to excel in the changing trends in global economy.

The department of Civil Engineering has developed two fold:

- It has well-established laboratories in subjects of Structural Engineering, Environmental, Hydraulics, Geotechnical, Transportation, Geology, Surveying and Computer Engineering. The department also maintains a well-equipped audio - visual room with facilities like VCR, TV, and overhead and slide projector for projecting videocassettes, CDs, slides and transparencies containing technical demonstrations. There are more than 200 videocassettes and CDs, 35 wall charts demonstrating various Civil Engineering theories and techniques.

- The department has developed linkages with C. W. P. R. S. Pune and INSWAREB Vishakhapattanan for research works in Hydraulics and concrete materials. The department also has access to laboratories of CW & PRS and libraries of IAT, Pune and I. I. T. Powai, Mumbai. The department maintains a separate departmental library consisting of some rare books.

The teaching staff of the department is actively involved in research works. The research works on protection of scour around bridge piers by riprap, use of mineral admixtures in concrete are some of the research work successfully done. The faculties of the department routinely publish their works in reputed journals and conferences at national and international level. The testing and consultancy cell of the department caters to the various technical services in Hydraulics, Soil Mechanics, Bridge and Dam foundations, Environmental Engineering, Concrete Materials and Surveying.

The department also runs a postgraduate course in Hydraulic Engineering. This course is blessed by the guidance of some of the internationally recognized scientists in the field of Hydraulics. The P.G. Students perform their dissertation works in collaboration with CW & PRS laboratories, especially the model studies. The undergraduate and postgraduate students have unlimited access to the Internet facility provided by the department. The Civil Engineering Students Association (CESA) serves as a platform for the overall development of the students. The CESA organizes personality development programs, guest lectures of experts; site visits to Civil Engineering projects and is also actively involved in social programs. The department has also organized national level workshop

on artificial neural network, Hydraulic structures and advances in concrete technology in the last few years.

MAJOR GROUPS / AREAS

Hydraulic Engineering, Structural Engineering, Computer Aided Analysis and Design, Concrete Technology, Environmental Engineering, Foundation Engineering, Surveying, Project feasibility, Engineering Geology.

EXPERTISE IN RESEARCH AND CONSULTANCY

Pump Testing, Precision Survey works, Analysis and Design of Structures, Testing of Concrete, Building Materials and Metals, Concrete Composites, Air & Noise pollution, Water quality, Geological Investigation for Civil Engineering Structures.

MAJOR EQUIPMENTS

Universal Testing Machine (1000KN & 200KN) with computer attachment, Compression Testing Machine (2000KN), Concrete Mixer, Torsion Testing Machine, Polariscopes, Wind Tunnel, Tilting Flume, Airflow Bench, Standard Penetration Tests set up, Electronic Distance Meter, High Volume Sampler with PMIO, Spectrophotometer, Nephelometer, Turbidity meter, Flame Photometer, Noise Level Meter.

SOFTWARE

Auto CAD 2000, STAAD-PRO, Geo-Concept GIS, MATLAB, Hit-Office

LABORATORIES

Testing of Materials, Engineering Mechanics, Geotechnical & Transportation Engineering Environmental Engineering, Fluid Mechanics & Hydraulic Machinery, Survey Laboratory, Geology Laboratory



STRUCTURE & EXAMINATION PATTERN

B. Tech. - CIVIL

Semester V										Total Duration : 34 Hrs/Week
										Total Marks : 750
Subject Code	Subject	Teaching Scheme			Examination Scheme				Total	
		L	P	D	Theory	Unit Test	TW & Pr	TW & Or		
K20301	Geotechnical Engineering	04	02	-	80	20	-	50	150	
K20302	Construction Operation & Equipment	04	02	-	80	20	-	50	150	
K20303	Structural Design-I*	04	-	04	80	20	-	50	150	
K20304	Fluid Mechanics-II	04	02	-	80	20	-	50	150	
K20305	Structural Mechanics-II	04	-	-	80	20	-	-	100	
K20306	Computer Applications in Civil Engineering-III	-	04	-	-	-	50	-	50	
Total		20	10	04	400	100	50	200	750	

Teaching Scheme			Examination Scheme				Total
Lectures	Practical	Drawing	Theory	Unit Test	T. W. & Pr	T. W. & Or	
20	10	04	400	100	50	200	750

Semester VI										Total Duration : 34 Hrs/Week
										Total Marks : 750
Subject Code	Subject	Teaching Scheme Hrs/Week			Examination Scheme				Total	
		L	P	D	Theory	Unit Test	TW & Pr	TW & Or		
K20307	Advanced Surveying	04	02	-	80	20	50	-	150	
K20308	Structural Design-II*	04	-	04	80	20	-	50	150	
K20309	Environmental Systems In Water and Waste Water Treatment	04	02	-	80	20	50	-	150	
K20310	Infrastructure Engineering-I	04	-	-	80	20	-	-	100	
K20311	Project Management	04	02	-	80	20	-	50	150	
K20312	Computer Applications in Civil Engineering-IV	-	04	-	-	-	50	-	50	
Total		20	10	04	400	100	150	100	750	

Teaching Scheme			Examination Scheme				Total
Lectures	Practical	Drawing	Theory	Test	T. W. & Pr	T. W. & Or	
20	10	04	400	100	150	100	750



RULES FOR CONDUCTING TESTS

Mode of the test

- In each semester for each subject three tests shall be conducted. The schedule for the same will be declared at the commencement of academic year in the academic calendar.
- Each test shall carry 20 marks.
- University examination pattern has given weightage of 20 marks for the tests.
- To calculate these marks following procedure is followed:
 - i) Out of the three tests conducted during the semester, the marks of only two tests in which the candidate has shown his/her best performance shall be considered, to decide the provisional marks in each subject.
 - ii) Average marks obtained in two tests in which students have performed well, shall be considered as provisional marks obtained by the student in the tests.
 - iii) If the candidate appears only for two tests conducted during the semester, he/ she will not be given benefit of the best performance in the tests.
 - iv) If the candidate appears only for one test conducted during the semester, to calculate the marks obtained in the tests it will be considered that the candidate has got 0 (zero) marks in other tests.
 - v) The provisional marks obtained by the candidate in class tests should reflect as proportional to theory marks. In cases of disparity of more than 15% it will be scaled down accordingly; These marks will be final marks obtained by the student. No scaling up is permitted.
 - vi) If the candidate is absent for theory examination or fails in theory examination his final marks for tests of that subject will not be declared. After the candidate clears the theory, the provisional marks will be finalized as above.
- Paper Pattern for Tests
 - i) All questions will be compulsory with weightage as following

Question 1	-	7 marks
Question 2	-	7 marks
Question 3	-	6 Marks
 - ii) There will not be any sub-questions.
- For granting the term it is mandatory to appear for all the three tests conducted in each semester.
- Roll numbers allotted to the students shall be the examination numbers for the tests.



SEMESTER - V



TEACHING SCHEME

Lectures : 04 Hrs/Week

Practical : 02 Hrs/Week

EXAMINATION SCHEME

Theory : 80 Marks

Duration : 03 Hours

Unit Test : 20 Marks

T. W. & Or. : 50 Marks

Unit-I

(06 Hours)

Introduction:

Soil and Soil Engineering, History of development of soil Mechanics, field of Soil Mechanics, Preliminary definitions and relationships, Soil as a three phase system, Water content, Density, Specific gravity, Voids ratio, Porosity, Degree of Saturation, Density Index.

Unit-II

(08 Hours)

Determination of Index Properties:

Water content, Specific gravity, Particle size distribution, Sieve analysis, particle size distribution curve, determination of Atterbergs limits, insitudensity, voids ratio, density index, Activity of clay, Sensitivity of Clays, Thixotropy of Clays.

Unit-III

(10 Hours)

Soil Structure Classification and Stress Distribution:

Classification of soil, Soil structure and Clay mineralogy, Textural classification of soil Highway research board classification, USCS, ISCS. Soil Structure, Inter particle forces in soil mass, Single grained structure, Honey comb structure, Clay minerals. Stressed at a point, geostatic stress elastic properties of soil, Boussinesqs theory, Point load, Line load, Strip load, Pressure distribution diagram on horizontal and vertical plane. Pressure bulb, Westergaards theory, Equivalent point load method, Newmark chart, Contact pressure.

Unit-IV

(08 Hours)

Permeability and Seepage Analysis:

Introduction, Darcy's law, validity of Darcy's law, Poiseuilles law of flow through capillary tube, Factors affecting permeability, determination of

coefficient of permeability, permeability of stratified soil deposits, theory; Head gradient and potential, seepage pressure, Upward flow wide condition, two dimensional flow, Laplace equation, graphical method of flow net construction Application of flow net.

Unit-V

(08 Hours)

Compaction and Earth Pressure Theories:

Introduction, Standard proctor test, modified proctor test, Jodhpur Minicomputer test, factors affecting compaction, Effect of compaction on properties of soil, Use of sand drains, Band drains, Sand columns and stone columns. Placement water content, relative compaction, compaction by explosives, Precompression use of geotextiles in roads, Erosion control, bearing capacity improvement, different types of geotextiles. Lateral earth pressure, Rankines earth pressure theory, Coulomb wedge theory, Rehmann's Construction for active pressure, Culmann's Construction for active pressure, Coulomb's passive earth pressure for cohesion less soil, Passive pressure by the friction circle method.

Unit-VI

(08 Hours)

Shear Strength of Soils:

Introduction, Mohrs Circle for two dimensional stress system, theories of failure of soil, Terzaghis effective stress principle, determination of shear parameters, direct shear test, Triaxial shear test, Unconfined Compression test, Vane shear test.

Term Work

Experiments are to be conducted as given below:

- Specific Gravity Determination by Pycnometer and Density bottle method
- Sieve analysis and classification of soil as per Indian Standard
- Determination of consistency limits on soil
- Insitu density test by core cutter and sand replacement method
- Determination of coefficient of permeability by constant head and variable head method

- Standard and modified proctor test
- Direct shear test
- Unconfined compression test
- Vane shear test
- C.B.R. Test
- Triaxial Shear Test
- Differential Free swell test

Note: T. W. & Oral examination shall be based on above term work

Text Books / References

- Shashi K. Gulhati, Manoj Datta, “Geotechnical Engineering”, Tata McGraw Hill Publishing Company, New Delhi
- Koerner Robert M., “Construction and Geotechnical Engineering”, Tata McGraw Hill Publishing Company, New Delhi
- Tomlinson M. J., “Foundation Design and Construction”, English Language Book Society
- Teng Wayne C., “Foundation Design”, Practice Hall of India Pvt. Ltd., New Delhi
- Punimia B. C., “Soil Mechanics and Foundation”, Laxmi Publications, Pvt. Ltd., New Delhi
- Terzaghi Karl, Ralph B. Peck, “Soil Mechanics in Engineering Practice”, A Wiley International Edition
- K.R. Arora, “Soil Mechanics & Foundation Engineering”

Syllabus for Unit Test

Unit Test 1	Units I & IV
Unit Test 2	Units II & V
Unit Test 3	Units III & VI



K20302: CONSTRUCTION OPERATIONS AND EQUIPMENTS

TEACHING SCHEME

Lectures : 04 Hrs/Week

Practical : 02 Hrs/Week

EXAMINATION SCHEME

Theory : 80 Marks

Duration : 03 Hours

Unit Test : 20 Marks

T. W. & Or. : 50 Marks

Unit-I

(08 Hours)

Introduction:

Role of construction Activity in the National and (Urban and Rural) Global development. Construction Labour and Equipment oriented, safety parameters – Time, Cost, and Quality. Necessity of mechanization of construction Industry. Types of construction such as Light, Medium and Heavy Duty. Erection Techniques for high rise structures, Use of Special types of Form work and Equipment. Advantages and disadvantages of High Rise structures.

Unit-II

(08 Hours)

Under Water Construction:

Coffer Dam and Caisson Definition and use. Pneumatic Sinking of caisson. Dredging techniques only. Construction of under deep water. Concrete walls, Piling-Driven and Bored Piles, Large diameter piles. Negative and positive skin friction. Pile driving Technique, Piles and Jetties.

Unit-III

(08 Hours)

Other Techniques:

Form Work- Aluform and Slip form Shuttering, Launching of Girders-Steel, Prestressed, Precast Bridges, Site Erection Methods, Grouting Methods, Tremix concreting, Tunnel Driving Technique with TBM-open and shield, Road Headers and Boomers. Redimix concrete, Placing concrete in Hot and cold weather, Transit Mix. Shot creating and Gunneting, Trenchless Technology, Micro Tunneling, Production of Crushed Sand and Aggregates.

Unit-IV

(08 Hours)

Earth Moving Equipments and Output of Equipments:

Power Shovels, Back-Hoe, Draglines, JCB-Excavator; Dozers; Scrapers; Trenches; Use of trucks and dumpers; Study, suitability and factors affecting selection of earth moving equipment output of equipment, Estimation and economics of equipment, Groups behavior involving labour and different equipments associated in a chain. Manpower requirement for different operations.

Unit-V

(08 Hours)

Soil Compaction Equipments and Soil Stabilization Techniques and other Equipments:

Rollers- Types (Suitability and use of each), Use of Geosynthetics and techniques of laying them in Retaining Walls, Slope Protection Works, Gabion Walls and Road Constructions. Pneumatic Drilling equipment, paving equipment, Crushers, Drill and blast method and road headers, Pumps (types and suitability, problems & economics).

Unit-VI

(08 Hours)

Utilities and Record Keeping:

Welding and welding techniques; Air Conditioning; Fire Safety; Electrical Services; Generators and compressors. Record keeping of machineries & equipments. Mode of payment for machineries.

Termwork

- Collection of pamphlets and information regarding various construction techniques equipments (Information pertaining to the following aspects should be collected)
 - a) Types, Different makes of the equipment
 - b) Useful Life and area of use
 - c) Equipment performance data

A report showing Comparison of the data collected should be submitted and a presentation on it should be done by the students

- Visit to a construction site covering minimum two different topics of the above

syllabus and the report of each should be submitted separately. That report should be supplemented with Necessary Drawings, Sketches and Photographs

- Assignments on economic and output of Construction Equipment - Earth moving equipment
- Video shows on Construction techniques and Machinery (video cassettes/ slides illustrating use of equipment and techniques should be arranged by the Institution)

Note: T. W. & Oral examination will be based on above term work

Text Books / References

- Peurifoy Robert L., William B. Ledbetter, "Construction Planning Equipment Methods", McGraw Hill Book Company
- Russel James E., "Construction Equipment", Reston Publishing Company
- Mahesh Verma, "Construction Equipment and Planning and Application", Metropolitan Book Company Pvt. Ltd., New Delhi
- Shetty M. S., "Concrete Technology- Theory and Practice", S. Chand and Company Pvt. Ltd., New Delhi

Syllabus for Unit Test

Unit Test 1	Units I & IV
Unit Test 2	Units II & V
Unit Test 3	Units III & VI



TEACHING SCHEME

Lectures : 04 Hrs/Week

Drawing : 04 Hrs/Week

EXAMINATION SCHEME

Theory : 80 Marks

Duration : 04 Hours

Unit Test : 20 Marks

T. W. & Or. : 50 Marks

Unit-I

(08 Hours)

Basic Concepts and Connections:

Steel as a structural material, Type of structural steel, Properties, Rolled steel sections. (Including introduction to cold formed sections, tube sections) and their Properties. Introduction to I, S,800, 806,816,875 etc. Behavior of bolted and welded connections (Type, Designations, Properties, Permissible stresses) failure of bolted and welded joints. Strength of bolt and strength of weld. Efficiency of joints. Design of simple bolted and welded connections.

Concept of Limit state design in steel, partial safety factor, Buckling (critical load) analysis, Sources of non-linearity, First order plastic analysis, Effect of Axial and shear force on plastic moment capacity, Local Buckling of plates.

Unit-II

(08 Hours)

Design of Axially Loaded Members:

Design of axially loaded Tension and Compression members.

Unit-III

(08 Hours)

Design of Simple and Built-up Beams:

Design of simple and built-up beams. Laterally restrained and unrestrained, Symmetrical and unsymmetrical sections. Curtailment of flange plates.

Moment resistant bolted and welded connections, Design of framed, beam to beam, beam to column connections.

Unit-IV

(08 Hours)

Design of roof Truss and Foot Over Bridge:

Design of roof truss, Load assessment for DL, LL and WL

Design of foot-over bridge

Unit-V

(08 Hours)

Design of Axially Loaded Built-up Columns and Column Bases:

Design of axially loaded built-up columns, Laced and battened, Column bases-slab base and gusseted base.

Unit-VI

(08 Hours)

Design of Plate Girder & Gantry Girder:

Design of welded plate girder. Concept of gantry girder.

Termwork

The term work shall consist of minimum TWO projects with 4 numbers of half imperial sheets based on following topics:

- Design of roof truss: Purlin, Principal rafter, Tie, Struts, Slings etc.
- Design of Building: Secondary beams, main beams, Columns, Beam to Beam and Beam to Column connections, column bases, etc.
- Design of Plate Girder: Web, Flange, Splicing, Horizontal & Vertical Stiffeners, curtailment of flanges etc.
- Design of Foot Over Bridge: Cross girder, Top Chord, Bottom Chord, Diagonal member etc.

The term work also consists of minimum two site visit reports related to above project topics.

Note: T. W. & Oral examination will be based on above term work

Text Books/ References

- N. Subhramanian, "Design of Steel Structures", Oxford University Press
- IS Specification IS:800-2007, IS:875-1987, IS:808-1989, SP-6(6)

Syllabus for Unit Test

Unit Test 1	Units I & IV
Unit Test 2	Units II & V
Unit Test 3	Units III & VI



TEACHING SCHEME

Lectures : 04 Hrs/Week

Practical : 02 Hrs/Week

EXAMINATION SCHEME

Theory : 80 Marks

Duration : 03 Hours

Unit Test : 20 Marks

T. W. & Or. : 50 Marks

Unit-I

(08 Hours)

Uniform Flow in Open Channels:

Basic Equations: Continuity Equation, Bernoulli's Equation, & Momentum Equation as applied to open channel one dimensional flow, Velocity distribution in open channel, Chezy's & Manning's formulae, factors affecting Manning's roughness coefficient, Normal depth, Conveyance Section factor, Most efficient channel section, Specific Energy, Specific Energy diagram, Depth-Discharge diagrams, alternate depths, Critical depth, Critical slopes, Froude number, Specific Force, Specific force diagrams, Conjugate depths, Depth-Discharge diagrams with respect to specific force, Devices for measurement of velocity and discharge in open channels, Stream gauging.

Unit-II

(08 Hours)

Gradually Varied Flow in Open Channels:

Gradually and rapidly varied flows, their examples, Basic assumptions in the derivation of GVF, Differential equations of GVF, Various GVF profiles, and their characteristics GVF Computations: Integration of GVF by Bresse's Method, Direct Step Method, Graphical Integration Method, Standard Step Method.

Unit-III

(08 Hours)

Rapidly Varied Flow:

Hydraulic Jump in Rectangular and Trapezoidal channels, Classification & Practical uses of Jump, Examples of occurrence of Hydraulic Jump, Conjugate Depths, Energy Dissipation in Hydraulic Jump, Location of Jump; Fluid Flow Around Submerged Bodies: Practical problems involving fluid flow around submerged bodies, Definition & Expression for Drag, lift, drag coefficient, Types of Drag, Dimensional analysis of drag

& lift, drag on spheres, cylinders, Flat plates & Aerofoil, Karman Vortex trail and its effects, Magnus Effect, Polar Diagram.

Unit-IV

(08 Hours)

Unsteady Flow:

Types, Flow through openings under varying head, Flow Compressibility, Celerity of Elastic Pressure Waves, Water Hammer Phenomenon, Rigid & Elastic water Columns Theories, Simple cases neglecting Friction, rapid acceleration of flow due to sudden opening of valve, surge tanks and their functions, Location and Classification, Computation of Maximum rise of Surge & Corresponding time of rise without friction, Impact of Jet: Force Exerted due to impact of jet on stationary and moving flat and curved plates using linear momentum Principle, Work done by Force in case of moving surfaces, Principle of angular momentum, Euler's Momentum Equation for Turbines.

Unit-V

(08 Hours)

Hydraulic Turbines:

Element of Hydropower plant, Hydraulic turbines, Heads & efficiencies, Governing of turbines, Cavitations in turbines, Performance of turbines, Prediction of performance in terms of unit quantities and specific quantities, specific speed, selection of turbines based on specific speed characteristic curves, Francis, Kaplan & Pelton Turbines

Unit-VI

(08 Hours)

Centrifugal Pump:

Classification, working, Priming, Theory of centrifugal pump, Centrifugal head due to rotation, Work done by impellers, Heads & efficiencies, Minimum starting speed, Introduction to design of radial flow type centrifugal pump, cavitations; Performance of pump: Prediction of performance in terms of specific quantities, specific speed, characteristic curves, reciprocating pumps, Comparison of Centrifugal Pump with other type of Pump, Selection of Pump

List of Practical I (any eight)

- Flow around a Circular Cylinder
- Flow around an aerofoil
- Impact of jet around flat / curved plate
- Performance Curves of Hydraulics Turbine
 - i) Constant Head Characteristic Curve
 - ii) Constant Speed Characteristic Curve
- Characteristics of Centrifugal Pump
- Uniform flow formulae of open channel
- Velocity distribution in open channel flow.
- Calibration of Standing wave flume
- Hydraulic jump as energy dissipater

List of Practical II (any two)

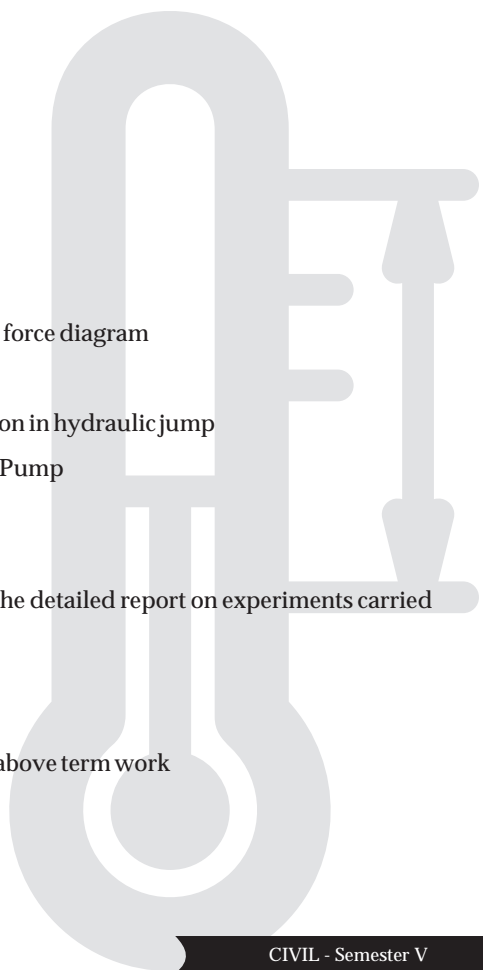
- Study of Specific energy diagram / Specific force diagram
- Characteristics of various GVF profiles
- Gradual Determination of energy dissipation in hydraulic jump
- Design of Hydraulic Turbine / Centrifugal Pump

Term Work

Term work will consist of a journal giving the detailed report on experiments carried out and assignments performed.

Oral Examination

T. W. & Oral examination shall be based on above term work



Text Books / References

- Garde R. J., Mirajgaonkar A. G., “Engineering Fluid Mechanics”, Scitech Publication, Chennai
- Rangaraju K. G., “Open Channel Flow”, Tata McGraw Publication
- Streeter Wylie, “Fluid Mechanics”, Tata McGraw Publication
- Subramanya K., “Open Channel Flow”, Tata McGraw Publication
- Ven Te Chow, “Open Channel Hydraulics”, Tata McGraw Publication

Syllabus for Unit Test

Unit Test 1	Units I & IV
Unit Test 2	Units II & V
Unit Test 3	Units III & VI



TEACHING SCHEME

Lectures : 04 Hrs/Week

EXAMINATION SCHEME

Theory : 80 Marks

Duration : 03 Hours

Unit Test : 20 Marks

Unit-I

(08 Hours)

Influence Lines and Rolling Loads:

Basic Concept of Influence lines, Construction of Influence Line Diagrams (ILD) for Support reactions, Shear Force and Bending Moment at a given section for simply supported beams, overhanging beams and compound beams. Muller-Breslau's principle and its application to above beams.

Rolling loads - Use of influence line diagram for determination of SF and BM in beams due to UDL shorter than span, UDL longer than span, Series of concentrated loads. Conditions for maximum SF and maximum BM values, Condition for maximum BM under a chosen load, Absolute maximum SF and BM, Concept of Equivalent UDL.

Influence line diagram for axial forces in members of plane determinate trusses. Use of influence line diagram for determination of member forces of plane determinate trusses under dead load and live load.

Unit-II

(08 Hours)

Analysis of Arches:

Arches – Concept and types of arches.

Three hinged arches – Influence line diagram for horizontal Thrust, Radial Shear, Normal Thrust and BM at a cross section.

Two hinged arches – Horizontal Thrust at support, Radial Shear, Normal Thrust and BM at a cross section. BM diagram for concentrated load and UDL.

Unit-III

(08 Hours)

Matrix Method of Analysis-Flexibility Method:

Fundamental concepts of flexibility method of analysis, Formulation of flexibility matrices. Applications to simple problems of beams, Pin-jointed

plane trusses and rigid jointed rectangular plane frames. (Involving not more than three unknowns).

Unit-IV

(08 Hours)

Plastic Analysis of Structure

Shape factor, Plastic hinge, Collapse mechanism, Upper bound and lower bound theorems. Applications to continuous beams, Fixed beams, Single bay single storied rectangular frames

Unit-V

(08 Hours)

Matrix Method of Analysis-Stiffness Method:

Fundamental concepts of stiffness methods of analysis, Formulation of stiffness matrices. Applications to simple problems of beams, Pin-jointed plane trusses and rigid jointed rectangular plane frames. (Involving not more than three unknowns).

Unit-VI

(08 Hours)

Approximate Methods of the Analysis:

Approximate methods of analysis of multistoried, multibay, 2-D rigid jointed frames by

- i) Portal method
- ii) Cantilever method
- iii) Substitute Frame Method

Text Books/References

- Hibbeler R. C., "Structural Analysis", Prentice Hall Publication
- Timoshenko S. P. & Young, "Theory of Structures", McGraw Hill Publication
- Norris, Wilbur & Utku, "Elementary Structural Analysis", TMH Publication
- Ramamrutham S. & Narayan R., "Theory of Structures", Dhanpat Rai Publishing Company
- Reddy C. S., "Basic Structural Analysis", Tata McGraw Hill Publication
- Junnarkar S. B. & Adavi, "Mechanic of Structures", Charotar Publishing House

- Pandit G. S. & Gupta S. P., “Theory of Structures- Vol-II”, Tata McGraw Hill Publication
- Prakash Rao D. S., “Structural Analysis”, Universities Press publication
- Pandit G. S. & Gupta S. P., “Matrix Methods of Structural Analysis”, Tata McGraw Hill Publication
- C. K. Wang, “Indeterminate Structural Analysis”, Tata McGraw Hill Publication
- Wilbur & Norris, “Basic Structural Analysis” Tata McGraw Hill Publication

Syllabus for Unit Test

Unit Test 1	Units I & IV
Unit Test 2	Units II & V
Unit Test 3	Units III & VI





K20306: COMPUTER APPLICATIONS IN CIVIL ENGINEERING- III

TEACHING SCHEME

Practical : 04 Hrs/Week

EXAMINATION SCHEME

T. W. & Pr. : 50 Marks

Software Applications

Practical

- Study of softwares in Civil Engineering
 - I) STAAD-PRO: Part-I
 - a) Analysis of frames
 - b) Design of steel members-Steel Column, Beams, and Truss, etc
 - ii) Hecras
 - iii) Geoconcept

Termwork

Assignments Based on any two softwares mentioned above.



SEMESTER - VI

123



TEACHING SCHEME

Lectures : 04 Hrs/Week

Practical : 02 Hrs/Week

EXAMINATION SCHEME

Theory : 80 Marks

Duration : 03 Hours

Unit Test : 20 Marks

T. W. & Pr. : 50 Marks

Unit-I

(08 Hours)

Triangulation and Triangulation Adjustment:

Introduction, Triangulation figures, Classification of Triangulation Systems, Measurement of angles, Trilateration, Triangulation adjustment-Types of errors, Laws of weights, Method of least squares, Probable error and its determination, Normal equation.

Unit-II

(08 Hours)

Elements of Photogrammetry:

Introduction, Aerial photograph and types, scale of vertical photograph, Relief displacement in Vertical photograph, Procedure of Aerial Survey, Ground Control, Parallax, Stereoscopic parallax, Mirror stereoscope, Parallax equation, Measurement of Parallax and determining the difference of elevation. Orthophoto, Photomosaic, Elements of visual photo interpretation.

Unit-III

(08 Hours)

Total Station and Hydrographic Surveys:

Total station and its principal features, field procedure for REM, RDM, free station, resectioning, coordinate reduction, errors and precisions in total station surveying, transfer software, post processing software, calibration of total station-concept and process. Hydrographic Surveys objects. Soundings- methods of locating sounding, three point problem and its solution by mechanical, analytical and graphical method.

Unit-IV

(08 Hours)

Remote Sensing:

Introduction, Electromagnetic energy, Electromagnetic spectrum, Effect of atmosphere on electromagnetic radiations, Energy interaction with earth

surface features, Remote sensing systems, various types of remote sensing platforms and sensors, Data Acquisition and interpretation, Resolution concept in remote sensing, False colour composite (FCC), Application of remote sensing, Land use/Land cover analysis, natural hazard management, resource exploration and environmental restoration, Remote sensing in India.

Unit-V

(08 Hours)

Geographic Information System (GIS):

Components of GIS: people, procedure, hardware, software and data – Data In put, Data manipulation, Data management, Query analysis and Visualization.

Application of GIS: Map making, Site selection, Emergency response planning, Limitations of GIS

Unit-VI

(08 Hours)

Space Positioning Techniques:

Introduction and concept, segments-space ;control and user, space positioning system in use Glonass, Galello sat, GPS signal, GPS receiver Navigational and geodetic, Selective availability and antispoofing, GPS positioning-point, relative, differential, kinematic. GPS coordinate, heights and coordinate transformation, Applications of GPS

List of Practicals

- One second theodolite-
 - a) Study and use of one second theodolite and measurement of horizontal angle
 - b) Measurement of horizontal angles by reiteration method and Measurement of vertical angle
- Study and use of total station-
 - a) Traverse Survey
 - b) Setting out points
 - c) Down loading the data from total station and developing a soft drawing format

- Study and Use of Nautical Sextant and solution of three point problem in hydrographic surveying
- Study and Use of Mirror stereoscope, parallax bar and determination of difference in elevation by differential parallax
- Adjustment of braced Geodetic quadrilateral
- Study and use of Handheld GPS for traverse survey
- Study and use of GIS software

Text Books /References

- Duggal S. K., “Surveying Vol-1, Vol-2”, Tata Mac Graw Hill pub. co., New Delhi
- Uren J., W. F. Price, “Surveying for Engineers”, Macmillan Pub.
- Anderson, “Introduction to Surveying”, Mc Graw Hill Pub.
- Punmia B. C., “Higher Surveying”, Laxmi Publications, New Delhi
- Wolf P. R., “Elements of Photogrammetry”, Mc Graw Hill
- Agarwal C. S., Garg P. K., “Remote Sensing in Natural Resources”, Wheeler Publishing

Syllabus for Unit Test

Unit Test 1	Units I & IV
Unit Test 2	Units II & V
Unit Test 3	Units III & VI



TEACHING SCHEME

Lectures : 04 Hrs/Week

Drawing : 04 Hrs/Week

EXAMINATION SCHEME

Theory : 80 Marks

Duration : 04 Hours

Unit Test : 20 Marks

T. W. & Or. : 50 Marks

Unit-I

(08 Hours)

Introduction of R.C.C:

Materials: Types of reinforcements, Study of properties of concrete and properties of steel.

Design Philosophies of R.C. Structures: Working Stress Method, Ultimate Load method, Limit State Method. Various limit states, semi-probabilistic approach, partial safety factors for materials and loads, various structural elements and loads on the elements, Load combinations.

Unit-II

(06 Hours)

R.C. Sections in Flexure:

Limit State Method: Assumptions, Strain variation diagram, Stress variation diagram; Concept of under reinforced, balanced, over reinforced section; Design parameters of a singly reinforced rectangular section, Moment of resistance of singly reinforced, doubly reinforced rectangular, flanged section.

Working Stress Method: Moment of Resistance of a singly reinforced rectangular Section.

Unit-III

(10 Hours)

Design of Beams for Flexure, Shear, Bond and Torsion:

Behaviour of R.C .beam in shear, Shear failure, Shear strength of beam Without shear reinforcement, Design of shear reinforcement. Bond- Introduction, Equilibrium and compatibility torsion, Code provision. Design of beams- Simply supported, cantilever, Continuous - Singly reinforced, doubly reinforced and flanged beam.

Redistribution of moments in beams: Introduction, Assumption, Modes of failure, Plastic hinge in R.C.members, Rotation of R.C.Members, Requirements of I.S.456-2000. Design of continuous members using various load arrangements.

Unit-IV

(08 Hours)

Design of Slabs:

One Way Slabs: Simply Supported, Cantilever, Continuous

Two Way Slabs: Simply Supported, Cantilever, Restrained

Design of Staircase: Dog legged, Open well

Unit-V

(08 Hours)

Design of Columns:

Columns- Axially loaded short columns, requirements of minimum eccentricity; Design of short columns for axial load, uniaxial, biaxial bending (use of SP 16); Checking safety of column for biaxial bending.

Unit-VI

(08 Hours)

Design of Footings:

Footings- Design of isolated column footing for axial load, uniaxial, Bending, Checking footing for other moments.

Termwork

- Design of G+2 storied building for gravity loads only. The design should include all types of slabs, beams, columns, footings and staircase (two flights) (Maximum three students in a group)
- Report of a site visit related to building structure under construction
- Four full imperial drawing sheets out of which only two sheets to be drawn using drafting software.

Oral

Oral shall be based on above termwork.

Text Books / References

- P. Dayaratnam, "Limit State Analysis and Design", Wheeler Publishing Company, New Delhi
- Punmia, Jain and Jain, "Comprehensive Design of R. C. Structures", Standard Book House

- Dr. V. L. Shah and Dr. S. R. Karve , “Limit State Theory and Design”, Pune Vidyarthi Griha Publications
- Sinha S., “RCC Analysis and Design- Vol. I, II”, Chand and Co, New Delhi
- P. C. Vergese, “Limit State Design”, Prentice Hall India Publications, New Delhi
- S. S. Bhavikatti, “Design of R.C.C. structural elements”, New Age International Ltd., Bangalore
- I.S.456-2000, SP-16, SP-34

Syllabus for Unit Test

Unit Test 1	Units I & II
Unit Test 2	Units III & IV
Unit Test 3	Units V & VI





K20309: ENVIRONMENTAL SYSTEMS IN WATER AND WASTE WATER TREATMENT

TEACHING SCHEME

Lectures : 04 Hrs/Week

Practical : 02 Hrs/Week

EXAMINATION SCHEME

Theory : 80 Marks

Duration : 03 Hours

Unit Test : 20 Marks

T. W. & Pr. : 50 Marks

Unit-I

(08 Hours)

Rural and Urban Water Supply schemes, different flow sheets, Sources of water- Surface water sources, Ground water Sources, Conveyance of water. Water demand and quantity, various demands, Factors affecting demand, Design period, population forecasting, Quality of Water of various sources, Common impurities and their effects, Physical, Chemical, Biological, radiological characteristics of water, Drinking water quality standards

Unit-II

(08 Hours)

Different Treatment flow sheets of various sources , necessity of treatment, principle, unit operations and unit processes

Aeration:

Types of aerators, gravity aerator and fixed spray aerator.

Sedimentation:

Plain Sedimentation, Principles and types of plain Sedimentation, details of Sedimentation tank, types of tanks, inlet and outlet arrangements; Design criteria like surface overflow rate, detention time, weir loading, depth of tank. Chemical assisted Sedimentation– Necessity, Unit operation, coagulation, Different coagulants, flocculation, factors affecting flocculation, Design of Flocculator; Tube settlers, theory, Design of Tube settler

Unit-III

(10 Hours)

Filtration:

Necessity, mechanisms, Theory of filtration, types of filters, pressure filters, dual and multi media filters, Different media, details of filter, Rapid sand filter and slow sand filter, design criteria, working and washing of rapid sand filter, design of rapid sand filter.

Disinfection:

Necessity, Different methods, chlorination,

reactions involved, Free And combined residual chlorine, Break point chlorination. UV disinfection, Ozonation

Advance Treatment Methods:

Water Softening- Chemical and ion exchange methods, Fluoridation and defluoridation, desalination, membrane technologies.

Unit-IV

(08 Hours)

Sewage Flow:

Sources of sewage, variations in sewage flow, Design of sanitary sewer, minimum size of sewer, velocities in sewers and gradient of sewers. Sewer appurtenances, Pumping of sewage, types of pumps for sewage pumping.

Unit-V

(08 Hours)

Characteristics of Waste Water:

Physical, chemical and biological characteristics, waste water sampling and analysis, interpretation and practical significance of test results, Important microorganisms in waste water treatment, Kinetics of biological growth.

Unit-VI

(08 Hours)

Stream Sanitation:

Self purification of natural streams, stream standards and effluent standards, oxygen sag curve.

Waste Water Treatment Systems:

Necessity of treatment.

Grit Removal:

Grit chamber, sources of grit, velocity in grit chamber, design of grit chamber.

Skimming:

Methods of oil and grease removal, importance of removal.

Primary Sedimentation:

Necessity, design of PST with inlet and outlet details, Sludge and its disposal.

Term Work

Term work will consist of Journal Report covering minimum 10 experiments prescribed below:

- Determination of pH and Alkalinity
- Determination of Total Hardness and its components
- Determination of Turbidity and Optimum dose of $Al_2(SO_4)_3$
- Determination of Chlorides
- Determination of Calcium and Magnesium
- Determination of Residual Chlorine and Chlorine Demand
- Determination of Total solids and its fractions
- Determination of Electrical conductivity of waste water
- Design of Treated water Distribution Network by Hardy Cross Method
- Site visit Report of Water Treatment Plant (Min. 2 based on different unit operations and unit processes)
- Design of water treatment plant units (Min. 2 units Manual and using software)

Note: T.W. & Practical Examination will be based on Term work report prepared and submitted.

Text Books / References

- Davis M. L., "Environmental Engineering", McGraw Hill Pub.
- "Government Manual on Water Supply and Treatment", Ministry of Urban Development, New Delhi
- Peavy, Rowe Techobanglous, "Environmental Engineering", McGraw Hill Pub.
- Punmia B. C., Jain, "Water Supply & Treatment", Arihant Publication
- Birdie G. S., "Water Supply & Sanitary Engineering", Dhanpat Rai Publishing Company
- Warren Viessman, Jr M. Hammer, "Water Supply & Pollution Control", ADDISON WESLEY Publication
- Hammer M. J., M. J. Hammer Jr, "Water & Wastewater Technology", Prentice Hall,

New Delhi

- Raju B. S. N, “Water Supply & Wastewater Engineering”, Natraj Publishers
- Elangovan, R. M. K. Saseetharan, “Unit Operations In Environmental Engineering”, New Age International Publishers
- “CPHEEO Manual on Operation and Maintenance”

Unit Test 1	Units I & II
Unit Test 2	Units III & IV
Unit Test 3	Units V & VI



TEACHING SCHEME

Lectures : 04 Hrs/Week

EXAMINATION SCHEME

Theory : 80 Marks

Duration : 03 Hours

Unit Test : 20 Marks

Syllabus for Unit Test

Unit-I

(08 Hours)

Introduction:

History, Comparison with other modes of transport recent developments in railways specially w.r.t track structure, Types of traction, Track components, Safety, Speed, Economy, Atomization, Comfort and consumer service. Advantages of railways as a mode of land transport. Organizational structure of Indian Railways, Railway lines, Classification based on speeds such as A, B, C, D, E, Q, R and S routes. (Practicals-2Hrs/Week)

Permanent Way Components:

Definition of track, Basic components, Ideal requirements, Rails- Functions, Specifications, Standard rail sections, Advantages of flat footed rails over other types, Acceptance tests, Weights of rail and its relation to axle load, Rail Defects, Rail flaw detector, Rail creep, Causes, Effects, Measurements and remedies of creep.

Sleepers - Definition, Functions, Specifications, Necessity of blanket/sub ballast, Design of ballast sections, Grading and quality of ballast.

Gauges: Types, Choice, Necessity of Uniformity, track standards related with track structure for BG and MG, Schedule of dimensions, I, II, III. Concept of over dimensioning consignment (ODC).

Unit-II

(08 Hours)

Formation, Welding, Fastenings:

Formation: Functions, Suitability for drainage, Treatment, Failure and remedies, Different cross sections of track in cutting and embankment. Track fittings and Fastenings- Rail joints -Fish plates- Limitations of fish plates, Welded rails- Methods of welding such as Electric Butt and Alumino Thermit Welding. Concept of Short welded rails (SWR), long welded rails

(LWR) and continuously welded rails (CWR), Advantages of welded joints. Rail sleeper fastenings -Conventional fastenings and their limitations. Elastic fastenings- Necessity and types such as Pandrol Clip and 'W' clip or Herber Meir (HM) fastenings, Arrangement for PSC sleepers.

Track Gauges, Gauges:

Types, Choice, Necessity of Uniformity, track standards related with track structure for BG and MG, Schedule of dimensions, I, II, III. Concept of over dimensioning consignment (ODC).

Standards and Stresses, Engineering Surveys and construction of track.

Track Stresses- Calculations for different stresses such as Bending, Thermal, Rail wheel contact stresses, Formation pressures, Fish plate and bolt hole stresses.

Introduction, Preliminary investigations, Traffic and Engineering Surveys, Information for preparation of project report. Plate laying methods- Operations involved, Distribution and labour gangs, Tram line method of plate laying in details, Requirement of track material for one Kilometer track, Ballast less or Slab track. Ballast trains and renewal of ballast.

Unit-III

(08 Hours)

Geometric Design:

Necessity, Types of Gradients, Curves, Grade compensation on curves, Alignment, Super elevation, Equilibrium speed, Maximum permissible limits of cant, Cant deficiency, Can't excess, Speed on curves. Safe speed on curves using Indian railway formula only for fully transitioned curves, Concept of negative cant, Gauge widening.

Points, Crossings, Turnouts & Track Maintenance Stations:

Functions, Components, Switches such as overriding and undercut, Crossing number, Angle of Crossing, Types of crossings, listing of types of Turn outs. Need for maintenance on conventional track structures, Common items of track maintenance. Use of modern track management system on Indian railways. Information to be collected on in permanent way, Inspectors section register. Track quality assessment and Monitoring.

Yards and Signaling:

Functions, Requirements and types only, Turntable, Triangle, Buffer stops, Scotch block. Objects, Classification, Semaphore Signal: Location of signals.

Temporary Signals in emergency such as caution indicator, Stop indicator speed indicator. Termination indicator for passenger and goods train. Indicator for dead stop restriction outside station limits. Indicators for reducing speed outside station limits for works of long duration.

Modernization w.r.t.

- a) Types of railways, traction
- b) High Speeds
- c) Improvements on track structure, components
- d) Atomization
- e) Safety Aspects

Unit-IV

(08 Hours)

Tunneling:

Introduction, Advantages and Disadvantages of tunnels with respect to open cuts. Transferring center line setting out and transfer of levels of underground. Criteria for selection for size and shape of tunnels, Meaning and Advantages of twin tunnels, Pilot tunnels, Portals and Shafts, Construction of shaft. Influence of geological condition of tunnels.

Tunnel methods- Soft and hard ground conditions

General characterizes of soft ground Needle beam method and NATM Method of tunneling in Practice. Calculations of stand up time and treatment to be given Shield method and pipe jacking

Tunneling method: Hard ground Conditions General; Sequence of operations and typical Distribution of time for each operation, Meaning of term "Faces of attack." Drill Blast method of Tunneling for hard strata, Different patterns of drilling. Computer aided drilling. Tunneling method using TBM and Road Header.

Unit-V

(08 Hours)

Techniques in Tunneling:

Methods of supporting roofs and walls, Shotcreting, SFRS, Cement grouting, Rock bolting cast insitu, Precast Lining, ISMB, Permanent Supports, Guniting Wire mesh.

Blasting Explosives–Types of Explosives, Methods of Blasting Quantity of Explosives Required for Blasting, Mucking, Methods of removal of Muck

and equipment used.

Dust prevention- Necessity of dust separation and methods of removal, Ventilation, Meaning of the term. Requirements of Ventilation system. Volume of air required, methods of ventilation with advantages and Disadvantages, Lightening and Drainage. Introduction to Metro Tunnels, under water tunnel Tubes.

Unit-VI

(08 Hours)

Docks and Harbours:

Introduction, Requirement of Harbor and ports, Classification of Harbors, Definition of the terms, Selection of site. Definition of Break water, Dock, Quay, Bulk Head, Wharves, Jetty, Dolphins, Fenders and types of all. Importance and use of Tetra pods, Tribars and Hexapods. Use of wet docks and dry Docks, Port facilities- General Idea about Transit sheds warehouses.

Text Books/References

- Bindra S. P., "Docks and Harbor Engineering", Dhanpat Rai and Sons, 1997
- Megraw T. M., J. Y. Bartett, "Tunnels, Planning Design and Construction", Ellis Homwood Limited, New York
- Mundrey J. S., "Railway Track Engineering", Tata McGraw Hill, New Delhi
- Oza H. P., G. P. Oza, "Dock and Harbor Engineering", Charotar Publishing House, 1998
- Saxena S. C., "A text book of Railway Engineering", Dhanpat Rain ad Sons, New Delhi, 1998
- Saxena S. C., "Tunnel Engineering", Dhanpat Rai and Sons, New Delhi, 1998
- Bickel J. O., "Tunnel Engineering Hand book", CBS Publishers, 1997
- B. N. Whittaken, R. C. Firth, "Tunneling - Design, Stability and Construction", Institute of Mining and Metallurgy Engineering, London

Syllabus for Unit Test

Unit Test 1	Units I & IV
Unit Test 2	Units II & V
Unit Test 3	Units III & VI



TEACHING SCHEME

Lectures : 04 Hrs/Week

Practical : 02 Hrs/Week

EXAMINATION SCHEME

Theory : 80 Marks

Duration : 03 Hours

Unit Test : 20 Marks

T. W. & Or. : 50 Marks

Unit-I

(08 Hours)

Introduction:

Introduction categories of project, Project life cycle, project manager education, experience qualities, project documentation, Feasibility report, cost estimate, project appraisal using benefit cost ratio, concept of organization importance of organization, Types of organization.

PWD organization & its organization chart.

Unit-II

(08 Hours)

Project Planning, Scheduling and Monitoring:

Gantt chart & its limitations, network planning C.P.M., PERT, Updating, Resource leveling, Cost Time Optimization: Direct cost, Indirect cost, Cost slope, Crashing of Network.

Unit-III

(08 Hours)

Materials Management:

Objectives of material management and its balancing with emphasis on supply management and cost reduction, material requirement, scheduling monitoring, receipts, storage, inspection inventory control, inventory classification, inventory management, Economic order quantity, inventory models, ABC analysis.

Unit-IV

(08 Hours)

Project Budgeting and Finance:

Budgeting and Financing Projects, Funding methods, Role of Finance adviser, Cost Control, Credit, Cash Credit, Break even methods, Types of budget; Preparation of budget, Procedure for master budget.

Unit-V

(08 Hours)

Linear Programming:

Identification and Formulation of L. P. Problem, Requirements and Assumptions in Linear Programming Model. Applications of Linear Programming Method Advantages and limitations of L. P. Models. Graphical method, Simplex method, Big M. Method.

Unit-VI

(08 Hours)

Total Quality Management in Construction

Quality-Necessity for improving quality, w.r.t. global challenges, concept of quality control, Quality Assurance quality Management & TQM, Study of various quality standards in construction.

Indian standards, Six Sigma Concept Designing of quality manual, check list and inspection reports, installing the quality assurance system, monitoring and control, study of ISO 9000, ISO 14000 and QS 9000 standards for certification procedures. Necessity of MIS in Management.

Termwork

Assignments:

- Different types of organizations and their flow charts
- Assignment on Bar Chart
- Assignments on CPM and PERT
- Assignments on Updating of Network
- Assignments on Resource leveling
- Assignments on Crashing of Network
- Assignments on ABC & EOQ Analysis
- Assignments on Linear Programming graphical method, Simplex method and Big M method
- Study of quality control system of a construction organization
- Monitoring of project using Network Techniques
- Prepare a Network for any construction project containing minimum 25 activities and find out critical path, Total float and free float

Oral

T.W. and Oral examination shall be based on above term work.

Text Books / References

- Prasanna Chandra, “Project Planning, Analysis selection, Implementation and Review”, Tata Mc Graw Hill, New Delhi
- Singh H., “Construction Management and Accounts”, Tata Mc Graw Hill, New Delhi
- Cormican D., “Construction Management, Planning and Finance”, Construction Press London
- Dr. B. C. Punmia, K. K. Khandelwal, “Project Planning and Control with PERT and CPM”, Laxmi publications (P) Ltd, New Delhi
- Premkumar Gupta, D. S. Hira, “Operations Research”, S Chand and Company Ltd., New Delhi
- S. Seetaraman, “Construction Management”, S. B. Nath Market, New Delhi
- L.C. Zhamb, “Inventory Control”
- Chitkara, “Civil Engg. Project Management”, Tata McGraw Hill Publication, precedence network technique

Syllabus for Unit Test

Unit Test 1	Units I & IV
Unit Test 2	Units II & V
Unit Test 3	Units III & VI



K20312: COMPUTER APPLICATIONS IN CIVIL ENGINEERING- IV

TEACHING SCHEME

Practical : 04 Hrs/Week

EXAMINATION SCHEME

T. W. & Pr. : 50 Marks

Software Applications

Practical

- Study of softwares in Civil Engineering
 - i) Auto Civil
 - ii) STAAD - PRO - Part-II - Design of R.C.C members- Beams, Columns, Slab & Footings
 - iii) WTPSOFTO 2NFQ.1doc
 - iv) M.S. Project

Termwork

Assignments based on any two softwares mentioned above.



RULES REGARDING ATKT, CONTINUOUS ASSESSMENT AND AWARD OF CLASS

A. T. K. T.

- A candidate who is granted term for B.Tech. Semester-I will be allowed to keep term for his/her B.Tech. Semester-II examination even if he/she appears and fails or does not appear at B.Tech. Semester-I examination.
- A candidate who is granted term for B. Tech. Semester - III will be allowed to keep term for his/her B.Tech. Semester-IV examination even if he/she appears and fails or does not appear at B.Tech. Semester-III examination.
- A candidate who is granted term for B.Tech. Semester-V will be allowed to keep term for his/her B.Tech. Semester-VI examination if he/she appear and fails or does not appear at B.Tech. Semester-V examination.
- A candidate who is granted term for B.Tech. Semester-VII will be allowed to keep term for his/her B.Tech. Semester-VIII examination if he/she appears and fails or does not appear at B.Tech. Semester-VII examination.
- A student shall be allowed to keep term for the B.Tech. Semester-III course if he/she has a backlog of not more than 3 Heads of passing out of total number of Heads of passing in theory examination at B.Tch. Semester-I & II taken together.
- A student shall be allowed to keep term for the B.Tech. Semester-V of respective course if he/she has no backlog of B.Tech Semester-I & II and he/she has a backlog of not more than 3 Heads of passing in theory examination and not more than 3 heads of passing in termwork and practical examination or termwork and oral examination.
- A student shall be allowed to keep term for the B.Tech. Semester-VII course if he/she has no backlog of B.Tech. Semester-III & IV and he/she has a backlog of not more than 3 Heads of passing in theory examination and not more than 3 Heads of passing in termwork and practical examination or termwork and oral examination.

CONTINUOUS ASSESSMENT

- In respect of Term work at B.Tech. Semester-I & II, B.Tech. Semester-III & IV and B.Tech. Semester-V & VI, target date shall be fixed for the completion of each, job, project experiment or assignment as prescribed in the syllabus and the same shall be collected on the target date and assessed immediately at an affiliated college by at least one pair of the concerned teachers for the subject and the marks shall be submitted at the end each term to the Principal of the college.

- Termwork and performance of Practical/Oral examination shall be assessed on the basis of the depth of understanding of the principles involved, correctness of results and not on ornamental or colorful presentation.
- For B.Tech. Semester-VII & VIII, termwork assessment will be done by external and internal examiners jointly during the examination schedule declared by the university. The record of continuous assessment shall be made available to the examiners during Term work and practical and Term work and oral examinations. Examiner shall use this record for overall assessment of the performance of the student. Every practical/termwork assignment shall be assessed on the scale of 20 marks and weightage of 20 marks shall be distributed as follows:

Sr. No.	Activity	Marks
1	Timely Submission	04
2	Presentation	06
3	Understanding	10

Marks obtained out of 20 for all assignments together will be converted on scale of marks assigned to term work of respective subject in the structure of the course.

CLASS

- The class should be awarded to the student on the basis of aggregate marks obtained together in both the semester of the respective year by him. The award of class shall be as follows.

A	Aggregate 66% or more marks	First Class with Distinction
B	Aggregate 60% or marks but less than 66%	First Class
C	Aggregate 55% or more marks but less than 60%	Higher Second Class
D	Aggregate 50% or more marks but less than 55%	Second Class
E	Aggregate 40% or more marks but less than 50%	Pass Class

