



**DR. A P J ABDUL KALAM UNIVERSITY,  
INDORE**

## **SYLLABUS**

*of*

**BACHELOR OF ENGINEERING**

**(Third Year, V AND VI SEM Grading System)**

**College of Engineering**

**Dr. A P J Abdul Kalam University, Indore**

# **DR. A P J ABDUL KALAM UNIVERSITY, INDORE**

## **Syllabus for Bachelor of Engineering**

### **List of Subject (Third Year, Grading System)**

#### **V Sem**

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#### **VI Sem**

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7	CE-607	Seminar / Group Discussion (Internal Assessment)	-
8	HU-223	NSS/NCC	-

**Unit I Introduction**

Purpose and importance of estimates, principles of estimating. Methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.

**Unit II Rate Analysis**

Task for average artisan, various factors involved in the rate of an item, material and labour requirement for various trades; preparation for rates of important items of work. Current schedule of rates(C.S.R.).

**Unit III Detailed Estimates**

Preparing detailed estimates of various types of buildings, R.C.C. works, earth work calculations for roads and estimating of culverts Services for building such as water supply, drainage and electrification.

**Unit IV Cost of Works**

Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building. Preparation of DPR.

**Unit V Valuation**

Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings..

**List of Experiments:-**

1. Preparation of detailed estimate.
2. Detailed estimate for services of plumbing and water supply or Electrification work.
3. Detailed estimate for earth work for the road construction or arched culvert.
4. Rate analysis for at least 8 items of construction.
5. Preparation of DPR of Civil Engineering Project..

**REFERENCES**

1. Quantity Surveying & Costing – B.N. Datta
2. Estimating & Costing for Civil Engg. – G.S. Birdi
3. Quantity surveying & costing – Chakraborty
4. Estimating & Costing – S.C. Rangawala

**A) Construction Materials:****Unit I Bituminous Materials and Mixtures**

Bitumen, Tar, Pitch and Asphalt, Asphalt Cement, Cut back Asphalt, Emulsified and Blown Asphalt, Properties of Asphalts, Consistency, Rate of Curing, Resistance to Action of Water, Ductility and Adhesion etc., Grades of Asphalt, Viscosity and Penetration Grading, Performance based Grading, Cut back Asphalt Grades, Asphalts Concrete, Asphalt Pavement, Applications of Asphalt.

**Unit II Advance Construction Materials**

Use of fly ash in mortars, concrete, fly ash bricks, Stabilized mud blocks, non-erodible mud plinth, d.p.c. materials, building materials made by Industrial & agricultural waste, clay products p.v.c. materials, advance materials for flooring, Doors & windows, facia material, interiors materials for plumbing, sanitation & electrification.

**(B) Construction Techniques of different Building elements:****Unit III Foundation**

Type of soils, bearing capacity, soil stabilization and improvement of Bearing capacity, settlement and safe limits. Spread foundations, wall footings, grillage, Foundations well foundation, causes of failure and remedial measures; under reamed piles, Foundation on shrinkable soils, black cotton soil, timbering for trenches, dewatering of Foundations. Hyperbolic paraboloid footing, brick arch foundation. Simple methods of foundation Design, damp proof courses, repairs techniques for foundations.

**Unit IV Masonry and Walls**

Brick masonry, bonds, jointing, stone masonry, casting and Laying, masonry construction, brick cavity walls, code provisions regarding load bearing and non Load bearing walls. Common defects in construction and their effect on strength and Performance of walls, designed brick masonry, precast stone masonry block, hollow concrete Block, plastering and pointing, white and color washing, distempering, dampness and its Protection, design of hollow block masonry walls. Doors, windows and ventilators: types Based on material etc., size location, fittings, construction sunshades, sills and jambs, RCC Doors/windows frames. Stairs types, rule of proportionality etc., repairs techniques for masonry, Walls, doors & windows.

**Unit V Floors & Roofs**

Types, minimum thickness, construction, floor finishes, flat roofs, RCC jack arch, reinforced brick concrete, solid slab and timber roofs, pitched roofs, false ceiling, Roof coverings, channel unit, cored unit, waffle unit, plank and joist, brick panel, l-panel, Ferro cement roofing units, water proofing .services : water supply & drainage, electrification, Fire protection, thermal insulation, air conditioning, acoustics & sound insulation, repairs to Damaged & cracked buildings, techniques and materials for low cost housing., repairs Techniques for floors & roofs.

**List of experiments:**

1. Nondestructive testing of concrete by rebound hammer test
2. Nondestructive testing of concrete by ultrasonic method.
3. Test for the effect of admixtures on the concrete compressive strength
4. Testing of micro-concrete
5. Design of concrete mix.
6. Drawing of different types of building elements.

**References:**

1. Mohan rai & m.p. jai singh; advance in building materials & construction,.
2. S.c. rangwala; engineering materials
3. Sushil kumar; building construction,
4. B.c. punmia; building construction ,.
5. Building construction, metchell
6. Construction technology, chudley r.
7. Civil engineering materials, n. Jackson.
8. Engineering materials, surendra singh.

**Unit I Kani's method**

Continuous beams and rigid frames (with and without sway), Symmetry and anti-symmetry, Simplification for hinged end, Support displacements.

**Unit II Column analogy method**

Continuous beams and rigid frames (with and without sway), Symmetry and anti-symmetry, Simplification for hinged end, Support displacements

**Unit III Matrix method of structural analysis:**

Analysis of indeterminate pin-jointed plane frames, continuous beams, rigid jointed plane frames (with redundancy restricted to two)

**Unit IV Plastic Analysis & Analysis of Tall Frames**

Statically indeterminate axial problems – Beams in pure bending – Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism – Plastic analysis of indeterminate beams and frames – Upper and lower bound theorems.

**Analysis of tall frames:** wind and earthquake loads, codal provisions for lateral loads  
Approximate analysis of multistory frames for vertical and lateral loads.

**Unit V Suspension Cables**

Analysis of Space trusses using method of tension coefficients – Beams curved in plan  
Suspension cables – suspension bridges with two and three hinged stiffening girders

**References**

1. Wang c.k. intermediate structural analysis, mcgraw hill, new york.
2. Kinney streling j. Indeterminate structural analysis, addison wesley.
3. Reddy c.s., basic structural analysis, tata mcgraw hill publishing company, new delhi.
4. Norris c.h., wilbur j.b. and utkys. Elementary structural analysis, mcgraw hill International, tokyo.
5. Weaver w & gere jm, matrix methods of framed structures, cbs publishers & distributors, Delhi.

**Unit I Hydrology**

Hydrological cycle, precipitation and its measurement, recording and non recording rain gauges, estimating missing rainfall data, rain gauge net works, mean depth of precipitation over a drainage area, mass rainfall curves, intensity-duration curves, depth-area duration curves, Infiltration and infiltration indices, evaporation stream gauging, run off and its estimation, hydrograph analysis, unit hydrograph and its derivation from isolated and complex storms, curve hydrograph, synthetic unit hydrograph.

**Unit II Floods and Ground water**

Types of floods and their estimation by different methods, probability and frequency analysis, flood routing through reservoirs and channels, flood control measures, economics of flood control, confined and unconfined aquifers, aquifer properties, hydraulics of wells under steady flow conditions, infiltration galleries. Ground water recharge necessity and methods of improving ground water storage. Water logging-causes, effects and its prevention. Salt efflorescence-causes and effects. Reclamation of water logged and salt affected lands.

**Unit III Water resources planning and management**

Planning of water resources projects, data Requirements, economic analysis of water resources projects appraisal of multipurpose projects, Optimal operation of projects, introduction to linear programming and its application to water Resources projects. Role of water in the environment, rain water harvesting, impact assessment of Water resources development and managerial measures..

**Unit IV Irrigation water requirement and soil-water-crop relationship**

Irrigation, definition, Necessity, advantages and disadvantages, types and methods. Irrigation development. Soils - types and their occurrence, suitability for irrigation purposes, wilting coefficient and field Capacity, optimum water supply, consumptive use and its determination. Irrigation methods surface and subsurface, sprinkler and drip irrigation. Duty of water, factors affecting duty and Methods to improve duty, suitability of water for irrigation, crops and crop seasons, principal Crops and their water requirement, crop ratio and crop rotation, intensity of irrigation.

**Unit V**

**Canal irrigation:** Types of canals, alignment, design of unlined and lined canals, Kennedy's and Lacey's silt theories, typical canal sections, canal losses, linings-objectives, materials used, Economics. Canal falls & cross drainage works, - description and design, head and cross Regulators. Escapes and outlets, canal transitions.

**Well irrigation:** Types of wells, well construction, yield tests, specific capacity level and Specific yield, hydraulic design of open wells and tube wells, methods of raising well water, Characteristics of pumps and their selection, interference of wells, well losses, advantages and Disadvantages of well irrigation.

### **List Of Experiments**

1. To determine precipitation for a given period using rain guage.
2. To determine evaporation by evaporimeter.
3. To determine infiltration index.
4. To design a canal section.
5. to analysis flood data & draw a flood hydrograph.

### **References**

1. Engg. Hydrology - J.NEMEC - Prentice Hall
2. Hydrology for Engineers Linsley, Kohler, Paulnus - Tata Mc.Graw Hill.
3. Engg. Hydrology by K. Subhramanya - Tata Mc Graw Hills Publ. Co.
4. Hydrology & Flood Control by Santosh Kumar - Khanna Publishers
5. Engg. Hydrology by H.M. Raghunath



**Unit I**

**Overview of structural dynamics:** Fundamental objective of structural dynamic analysis - types of prescribed loadings - essential characteristics of a dynamic problem - method of discretization: lumped mass procedure - generalized displacements - the finite-element concept

**Single degree of freedom systems:** Components of the basic dynamic system formulation of the equations of motion - direct equilibration using D'Alembert's principle - principle of virtual displacements - generalized SDOF systems - rigid body assemblage.

**Unit II**

**Free vibration response:** Solution of the equation of motion - undamped free vibrations - damped free vibrations - critical damping - underdamped systems - overdamped systems - negative damping.

**Response to harmonic loading:** Undamped system complementary solution - particular solution - general solution - response ratio - damped system - resonant response.

**Unit III**

**Response to periodic loading:** Fourier series expression of the loading - response to the fourier series loading - exponential form of fourier series solution

**Response to impulsive loads:** General nature of impulsive loads - sine-wave impulse - rectangular impulse - triangular impulse - shock load.

**Unit IV**

**Response to general dynamic loading:** Duhamel integral for an undamped system - numerical evaluation of the duhamel integral for an undamped system - response of damped systems - response analysis through the frequency domain.

**Multi degree of freedom systems:** Formulation of the MDOF equations of motion - selection of the degrees of freedom - orthogonality conditions - normal co-ordinates - uncoupled equations of motion - undamped & damped - mode superposition procedure

**Unit V**

**Continuous parameter systems:** Vibration analysis by Rayleigh's method - basis of the method - approximate analysis of a general system - selection of the vibration shape - improved Rayleigh method

**Practical vibration analysis:** Preliminary comments - stodola method - fundamental mode analysis – proof of convergence - analysis of second mode - analysis of third and higher modes-analysis of highest mode - Rayleigh's method in discrete co-ordinate systems.

**References:**

1. Clough R.W. & Penzien J., Dynamics of Structures, McGraw Hill
2. Weaver W., Jr. Timoshenko S.P., Young D.H, Vibration Problem in Engineering, John Wiley
3. Meivovitch L., Elements of Vibration Analysis, McGraw Hill
4. Seto W.W., Mechanical Vibrations, Schaum's Outline Series, McGraw Hill
5. Srinivasan P., Mechanical Vibration Analysis, Tata McGraw Hill

**CAD Software :** Meaning, various CAD software available in the market AutoCAD, Felix Cad, Auto Civil, 3D Max ; etc.) Starting up of CAD, CAD Window, Tool bar, Drop down menu, Command window, Saving the drawing. Introduction of Graphic screen.

**CAD Commands :** WCS icon, UCS icon, co-ordinates, drawing limits, grid, snap, ortho features. Drawing commands, line, circle, polyline, multiline, ellipse, polygon etc. Editing commands – Copy, move, offset, fillet, chamfer, trim, lengthen, mirror, rotate, array etc. Working with hatches, fills, dimensioning, text etc.

**Submission / Working Drawing :** Generation of line plan, Detailed Plan, elevation, section, site plan, Area statement, Generation of 3D view and print commands, Introduction to Auto Civil , 3D Max. Note:

**Above theoretical aspects should be covered in the practical periods**

### List of Experiments

**A) Building Drawing :** Following exercises shall be completed with CAD software and Print of all the drawings should be prepared on A3 / A4 size paper :

- 1) Preparation of line plan of a residential building.
- 2) Preparation of line plan of a Public building.
- 3) Preparation of detailed plan of a small residential building
- 4) Preparation of submission drawing of residential building – showing Plan, Elevation, Section, Schedule of openings, Site Plan and Area Statement

**B) Civil Engineering Drawing :** Preparation of Drawings with CAD software for the following exercises (Any Three) and Print of all the drawings should be prepared on A3 /A4 size paper.

- 1) Plan, Cross Section and Longitudinal section of a Culvert (Pipe culvert/Box Culvert).
- 2) Section of an Earthen Dam.
- 3) Plan and Section of K. T. Weir.
- 4) Cross Section of Retaining wall.
- 5) Bonds in brickwork – Plan and Elevation for English bond and Flemish bond for one brick thick wall.
- 6) Cross Section of ESR (Over Head Tank).
- 7) Cross Section of Clarri - flocculator

**Objective:** To develop conversation skills, group skills, persuasion skills, presentation skills, critical and creative thinking, emotional skills, positive thinking and vocational skills.

### **Unit I Development of Proficiency in English**

- Practice on Oral and spoken communication skill & testing –
- voice & accent, voice clarity, voice modulation & intonation, word stress etc.
- Feedback and questioning Technique
- Objectiveness in Argument
- Development etiquettes and manners
- Study of different pictorial expression of non-verbal communication and its analysis

### **Unit II Microsoft office**

- Microsoft word,
- Microsoft power point, Microsoft Excel,
- use of skype,
- use of internet

### **Unit III Communication skills**

- Visual, nonverbal and aural communication,
- Understanding the communicative environment,
- Understanding the communicative environment,
- What to listen for and why,
- When to speak and how,
- Starting and sustaining a conversation

### **Unit IV Communication skills Visual, nonverbal and aural communication**

- The world of visual culture
- Visual perception
- The aural: Its relevance and impact
- The body and the way it communicates
- The face, its expressions and what it says

### **Unit V Concept of 4 method for presentation**

- Preparation & introduction
- Presentation
- Evaluation / feedback
- Summarization / Conclusion
- Presentation Skill practice
- Preparing in presentation
- Delivery of presentation

### **References**

1. E.H. Mc Grath: S.J.:Basic Managerial Skills for All (Published by Phi)
2. Allen Pease:Body Language(published by agreement and Pease international)
3. Joan Lambert: Microsoft Office 2016 Step by Step (Step By Step (Microsoft)

**Unit I Water supply & Sewage collection**

Rural water supply schemes, financing and management of water supply project, water pollution control act, conservancy & water carriage system, sanitary appliance and their operation, building drainage system of plumbing

**Unit II Water Treatment methods**

Theory and design of sedimentation, coagulation, filtration, disinfection, aeration & water softening, modern trends in sedimentation & filtration, miscellaneous methods of treatment.

**Unit III Preliminary treatment of Sewage**

Unit operations for waste water treatment, preliminary treatment such as screens, grit chamber, floatation tank, sedimentation and chemical clarification, role of micro-organism in biological treatment, Sewage filtration- theory & design.

**Unit IV Biological treatment of Sewage & Sludge treatment**

Methods of Biological Treatment (Theory & Design) - Activated Sludge process, Oxidation ditch, stabilization ponds, aerated lagoon, anaerobic lagoons, septic tank & imhoff tank, sources & treatment of sludge, sludge thickening and digestion sludge drying beds, sludge disposal.

**Unit V Advanced Waste Water treatment**

Diatomaceous earth filters, ultrafiltration, Adsorption by activated carbon, Phosphorus removal, Nitrogen removal, Physico chemical waste water treatment, Solid waste disposal - classification, composition, collection, & disposal methods. Rural sanitation - collection & disposal of refuse, sullage & night soil

**List of Experiment**

1. To study the various standards for waste water
2. To study the sampling techniques for waste water
3. To determine the alkalinity in water sample
4. To determine the acidity in water sample
5. Determination of Dissolved Oxygen in the water and waste water sample
6. Determination of Biological Oxygen demand of a waste water sample
7. Determination of Chemical Oxygen demand of a waste water sample
8. Determination of various types of solids in the waste water sample
9. Determination of bacterial number by membrane filter Technique
10. Determination of bacterial colonies by standard plat count method

## Reference

1. Water Supply & Sanitary Engg. - G.S. Birdie - Dhanpat Rai Publishing Company, (P) Ltd. New Delhi
2. Waste Water Engg. by B.C. Punmia - Laxmi Publication (P) Ltd. New Delhi
3. Environmental Engg. - M.L. Davis & D.A. Cornwell - Mc Graw Hill Company
4. Chemistry for Environmental Engg. - Sawyer & Mc Carty - Mc Graw Hill Book Company New Delhi
5. Water & Waste Water Technology - Mark J Hammer - Prentice - Hall of India, New Delhi
6. Waste Water Engineering - Metcalf & Eddy - Mc Graw Hill Book Company New Delhi
- 7.

**Unit I Introduction & classification of soil**

Definition of soil and soil mechanics, common soil mechanics problems in Civil Engineering. Principal types of soils. Important properties of very fine soil. Characteristics of main Clay mineral groups. Weight volume relationship and determination of specific gravity from pycnometer test. Field density from sand replacement method and other methods.

**Unit II Index properties of soil**

Grain size analysis. Stokes's law and Hydrometer analysis. Consistency and sensitivity of Clay, Atterberg Limits, Flow Index and Toughness Index. Underlying theory of shrinkage limit determination. Classification of coarse and fine grained soils as per Indian Standard.

**Unit III Seepage analysis of soil**

Concept of effective stress principal, seepage pressure, critical hydraulic gradient and quick sand condition. Capillary phenomenon in soil. Darcy's Law and its validity, seepage velocity, co-efficient of permeability (k) and its determination in the laboratory. Average permeability of stratified soil mass, factors affecting 'k' and brief discussion

**Unit IV Compaction & Consolidation**

**Compaction:** Definition and object of compaction and concept of OMC and zero Air Void Line. Modified proctor Test. Factors affecting compaction Effect of compaction on soil properties and their discussion. Field compaction methods- their comparison of performance and relative suitability. Field compactive effort, Field control of compaction by proctor.

**Consolidation:** compressibility & consolidation of soil, terzaghi's one dimensional consolidation theory, pressure void ratio relationship, primary & secondary consolidation.

**Unit V Shear strength & stability of slopes**

**Shear strength:** Stress analysis of a two dimensional stress system by Mohr circle. Concept of pole. Coulomb's law of shear strength coulomb - Mohr strength theory. Relation between principal stresses at failure. Direct, triaxial and unconfined shear strength tests. Triaxial shear tests based on drainage conditions typical strength envelopes for clay obtained from these tests. Derivation of skempton's pore pressure parameters. Stress strain and volume change characteristics of sands.

**Slope Stability:** Slope failure mechanisms – Types - infinite slopes – finite slopes – Total stress analysis for saturated clay – Fellenius method - Friction circle method – Use of stability number - slope protection measures.

### **List of Experiment**

1. Determination of hygroscopic moisture content of soil
2. determination of specific gravity of soil.
3. Determination of field density by sand replacement method.
4. Determination of field density by core cutter method
5. Grain size analysis of soil by :
  - a) Sieve analysis
  - b) Sedimentation analysis
6. Determination of Liquid limit of soil by Casagrande method.
7. Determination of Liquid limit of soil by Cone penetrometer.
8. Determination of Plastic limit of soil
9. Determination of Shrinkage limit of soil
10. Determination of free swell of soil.

### **Reference**

1. Soil Mech. & Foundation Engg, by K.R.Arora Standard Publishers Distributors
2. Geotechnical Engineering, by P. Purshotama Raj Tata McGraw Hill
3. Soil Mech. & Foundation Engg., by V.N.S.Murthy CBS Publishers & Distributors.
4. Principle of Geotechnical Engineering by B.M.Das Cengage Publisher
5. Basic and applied Soil Mechanics by Gopal Ranjan and A.S.R.Rao New Age International Publishers.
6. Geotechnical Engineering by Gulati and Datta, Tata McGraw Hill
7. Problems in Soil mechanics and Foundation Engineering by B.P.Verma, Khanna Publishers.

**Unit I Highway**

Classification of roads, road patterns, brief history of road development around the world, road development plans of India, present status of roads in India, alignment design, requirement & controlling factors, use of aerial photography & remote sensing, other surveys.

**Unit II Geometric Design (Highway)**

Typical cross sections in urban & rural roads, various cross section elements, width of carriageway, shoulders, medians, width of roadways, right of way, camber, design speed, sight distance, stopping sight distance, passing sight distance, sight distance at intersection, passing zones, super elevations, setback, extra widening on horizontal curve, transition curve, design of horizontal & vertical alignment, combinations of horizontal & vertical alignment.

**Unit III Traffic Engineering**

Definition, road user & vehicle, traffic studies- speed, volume, origin & destination, capacity, parking & accidents, traffic signs, traffic markings, traffic signals-types, signal systems, warrants & design, traffic management, intersection types- at grade & grade separations, rotary design, street lighting.

**Unit IV Docks and Harbours**

Types - Layout and planning principles- breakwaters - docks- wharves and quays - Transit sheds- warehouses- navigation aids. Urban transportation systems - Bus transit - Mass Rapid Transit System - Light Rail Transit. Transport economics and Financing - Intelligent Transportation Systems (ITS)

**Unit V Airport Engineering**

Aircraft characteristics - Airport obstructions and zoning - Runway - taxiways and aprons- Terminal area planning

**List of Experiment**

1. To determine spot velocity of a vehical
2. Study & analysis of signal.
3. To determine capacity of a rotary.
4. Study & analysis of a parking
5. To determine the traffic volume at a road section.



## Reference

1. Highway Engineering by Gurucharan Singh
2. Principles of Pavement Design by E.J. Yoder & M.W. Witzech
3. Highway Engineering by O'Fleherly
4. Highway Engineering by S.K. Khanna & C.E.G. Justo
5. Airport Planning & Design by S.K. Khanna & M. G. arora
6. Foresch, Charles "Airport Planning"
7. Horonjeff Robert "The Planning & Design of Airports"
8. Sharma & Sharma, Principles and Practice of Highway Engg.
9. Haung, Analysis and Design of Pavements
10. Relevant IRC & IS codes
11. Laboratory Mannual by Dr. S.K. Khanna
12. Highway Engg. By Hews & Oglesby
13. Highway Material by Walker

**Unit I Basic Principles of Structural Design**

Assumptions, Mechanism of load transfer, Various Properties of concrete and reinforcing steel, Introduction to working stress method and limit state Methods of design, partial safety factor for load and material. Calculation of various loads for Structural design of singly reinforced beam, Partial load factors.

**Unit II Design of Beams**

Doubly reinforced rectangular & Flanged Beams, Lintel, Cantilever, simply Supported and continuous beams, Beams with compression reinforcement: Redistribution of Moments in continuous beams, Circular girders: Deep beams. Design of beam for shear and Bond.

**Unit III Design of Slabs**

Slabs spanning in one direction. Cantilever, Simply supported and Continuous Slabs, Slabs spanning in two directions, Yield line theory, Circular slabs.

**Unit IV Columns & Footings**

**Columns:** Effective length of columns, Short and long columns- Square, Rectangular and Circular columns, Columns Subjected to axial loads and bending moments (sections with no tension),

**Footings:** Isolated and combined footings, Strap footing Raft foundation.

**Unit V Staircases:**

Staircases with waist slab having equal and unequal flights with different support Conditions, Slabless tread-riser staircase.

NOTE :- All the designs for strength and serviceability should strictly be as per the latest version Of IS:456. Use of SP-16 (Design aids)

**List of Practicals**

1. To design a beam section for given load.
2. To design a column section & footing for given load.
3. To design a one way slab.
4. To design a two way slab.
5. To design a dog-legged staircase.

**Reference**

1. Plain & Reinforced Concrete Vol. I & II – O.P. Jain & Jay Krishna
2. Limit State Design by P.C.Varghese ; Prentice Hall of India, New Delhi
3. Design of Reinforced Concrete Elements by Purushothman; Tata mcgraw Hill, New Delhi
4. Reinforced Cement Concrete by Gupta & Mallick, Oxford and IBH
5. Reinforced Cement Concrete by P. Dayaratnam, Oxford and IBH
6. Plain & reinforced concrete - Rammuttham
7. Plain & reinforced concrete – B.C. Punnia
8. Structural Design & Drawing by N.K.Raju.

**Unit I Preliminary and detailed investigation methods**

Methods of construction, form work and centering. Schedule of construction, job layout, principles of construction management, modern management techniques like CPM/PERT with network analysis.

**Unit II Construction equipments**

Factors affecting selection, investment and operating cost, output of various equipments, brief study of equipments required for various jobs such as earth work, dredging, conveyance, concreting, hoisting, pile driving, compaction and grouting.

**Unit III Tenders & Contracts**

Different types of Tenders & Contracts, notice inviting tenders, contract document, departmental method of construction, rate list, security deposit and earnest money, conditions of contract, arbitration, administrative approval, technical sanction..

**Unit IV Specifications & Public Works Accounts**

Importance, types of specifications, specifications for various trades of engineering works. Various forms used in construction works, measurement book, cash book, materials at site account, imprest account, tools and plants, various types of running bills, secured advance, final bill.

**Unit V Site Organization & Systems Approach to Planning**

Accommodation of site staff, contractor's staff, various organization charts and manuals, personnel in construction, welfare facilities, labour laws and human relations, safety engineering. Problem of equipment management, assignment model, transportation model and waiting line modals with their applications, shovel truck performance with waiting line method.

**References**

1. Construction Equipment by Peurify
2. CPM by L.S. Srinath
3. Construction Management by S. Seetharaman
4. CPM & PERT by Weist & Levy
5. Construction, Management & Accounts by Harpal Singh
6. Tendering & Contracts by T.A. Talpasai

**Objectives:** To make students well versed with at the business communication skills.

**Unit I Essential and vocational skills: survival strategies**

- i. Managing time
- ii. Managing stress
- iii. Resilience
- iv. Work-life balance
- v. Applying soft-skills to workplace

**Unit II Written Communication Skill Practice for:**

- i. Correction of errors
- ii. Making of Sentences
- iii. Paragraph Writing
- iv. Leave Application and simple letter writing

**Unit III Team Building / Coordination Skills**

- i. Team Building Practices through group exercises , team task / role play
- ii. Ability to mixing & accommodation
- iii. Ability to work together

**Unit IV Self Management**

- i. Self Evaluation
- ii. Self Discipline
- iii Self Criticism
- iv. Recognition of one's own limits and deficiencies
- v. Independency etc.
- vi. Thoughtful & Responsible
- vii. Self Awareness

**Unit V Team Management Technique**

- i. Practice by game play & other
- ii. learning methodology for achieving
- iii targets and getting of right first time

**References**

1. Soft skills Training – A workbook to develop skills for employment by Fredrick H. Wentz
2. Personality Development and Soft skills , Oxford University Press by Barun K. Mitra
- 3.The Time Trap : the Classic book on Time Management by R. Alec Mackenzi