DR. A P J ABDUL KALAM UNIVERSITY, INDORE

SYLLABUS

For

DIPLOMA CIVIL ENGINEERING

(THIRD YEAR, 6th SEM)

Dr. A P J Abdul Kalam University, Indore

DR. A P J ABDUL KALAM UNIVERSITY, INDORE

Syllabus for Diploma Electronics & Telecommunication

List of Subject (Third Year, 6th Semester)

Unit 1 Introduction: Duties of P.H. Engineer, Need and importance of P.H.E.

Unit 2 Quantity of Water & Source of water:
Demands of water: Domestic, Industrial, Commercial & Institutional, Public use, Losses and wastes, Fire demand ;Factors affecting rate of Demand, Variations of water demands, Forecasting of population, Methods of forecasting of population, Design period for water supply scheme. Estimation of quantity of water supply required for a town or city, Types of water supply schemes.
Source of water: Surface and Subsurface sources of water**,** Ground water, Open well, Tube-Well, infiltration well, infiltration gallery, infiltration pipes. Construction of dug well. Construction of tube well, Well Testing. Yield of well. Intake Structures-Definition and types, Factors governing the location of an intake structure, Water conservation, Ground water recharging – Necessity, Importance and advantages

Unit 3 Quality of Water & Purification of Water: Effect of different impurities on water, surface/ ground water, Water borne disease. Need for analysis of water, Characteristics of water-Physical, Chemical and Biological, Testing of water for Total solids, hardness, chlorides, dissolved Oxygen, pH, Bacteriological tests, Sampling of water, Water quality standards as per I.S.
Purification of Water : Screening- Types of screens, Aeration- objects and methods of aeration, Plain sedimentation, Sedimentation with coagulation, principles of coagulation, types of coagulants, Jar Test, process of coagulation, types of sedimentation tanks, Filtration theory of filtration, classification of filters : slow sand filter, rapid sand filter, pressure filter, domestic filter, filter media, construction and working of slow sand filter and rapid sand filter, Disinfection: Objects, methods of disinfection, Chlorination- Application of chlorine, forms of chlorination, types of chlorination practices, residual chlorine and its importance, Flow diagram of water treatment plants,

Unit 4 Conveyance and Distribution of Water:
Types of Pipes used for conveyance of water, choice of pipe material, Types of joints & Types of valves- their use, location and function on a pipeline. Methods of distribution of water- Gravity, pumping, and combined system Service reservoirs – functions and types , Layouts of distribution of water- Dead end system, grid iron system, circular system, radial system ; their suitability, advantages and disadvantages

SANITARY ENGINEERING

Unit 5 Building Sanitation:
Importance and necessity of sanitation, Necessity to treat domestic sewage, Recycling and Reuse of domestic waste Definitions-Sewage, sullage, types of sewage, Definitions of the terms related to Building Sanitation-Water pipe, Rain water pipe, Soil pipe , Sullage pipe, Vent pipe, Building Sanitary fittings- Water closet –Indian and European type, flushing cistern, wash basin, sinks, Urinals, Traps- types, Systems of plumbing – one pipe, two pipe, single stack, layout plan for building sanitary fittings (drainage plan) , inspection and junction chambers, their necessity, location.

Unit 6 Systems of Sewerage:
Types of Sewers, Systems of Sewerage, Principle of Design of sewers, self cleansing velocity and non scouring velocity Laying, Testing and maintenance of sewers. Sewer Appurtenances**,** Manholes and Drop Manhole-component parts, location, spacing, Sewer Inlets, Street Inlets, Flushing Tanks – manual and automatic.

Unit 7 Analysis of Sewage:
Characteristics of sewage, B.O.D./ C.O.D. and significance. , Aerobic and anaerobic process, Madhya Pradesh Pollution Control Board Norms for the discharge of treated sewage.
Treatment of Sewage:
Objects of sewage treatment, General layout and flow diagram, Screening, Grit removal, Skimming, Sedimentation of sewage, Sludge digestion, Trickling filters, Activated sludge process, Disposal of sewage, Septic tank, Oxidation pond, Oxidation ditch. Common Complaints in the operation of septic tank and remedies**.**

Unit 8 Rural Sanitation:
Environmental Sanitation Necessity and importance, Rural sanitation- Types of Privies – Aqua privy and Bore Hole Latrine construction and working Composting (Nadep or Vermiculture).

References

1. Text Book of Water supply and sanitary Engg by Husain. S.K., Oxford and IBH publlshing Co. New Delhi
2. Water supply and Sanitary Engg. By Birdie G.S. and Bridie J.S. , Dhanpat Rai & Sons,
3. Delhi
4. Jal Apurti Evam Swachchhata Engg by Sunil and Rajjan, Navbhart Prakashan, Meerut
5. Water Supply & Sanitary Engg. By Gurucharan Singh, Standard Publishers
6. The committee on PHE Manual and code of practice, The Ministry of Health, Govt. of India, "PHE Manual and code of practice – Sections,I, II, III and IV.
7. I.S. : 1172, 1742, 2065, 2470 and 5329
8. Lok Swasthya Yantriki by Saxena A.K., Deepak Prakashan Gwalior
9. Environmental Engg. (Volume I & II) by Santosh Garg, Khanna Publishers
10. Water Supply & Sanitary Engg by S.C. Rangwala , Charottas Publishing House,

List of Experiments

1. Turbidity test. 2. Colour test.
3. Test for PH, Hardness, Chlorides, Iron & manganese.
4. Test for B-Coil.
5. Test for residual chlorime.
6. Test for total, volatile, fixed suspended and settable.
7. Test for D.O., B.O.D., C.O.D. and starbility.
8. To determine suspended solids, dissolved solids and total solids of waste water sample.
9) Design the Septic Tank for the public building such as hostel or hospital. Draw Plan and Section of the same along with the drainage arrangement in soak pit.

Unit 1 Estimate of R.C.C. Structure:
Estimate of slab, beam, T-beam. Estimate of R.C.C. column with its footing. Preparation of Abstract of above items. Preparation of Bar bending schedule, and to calculate amount of steel

Unit 2 Estimate of Steel / Timber Structures:
Estimate of steel column (Stanchion) Estimate of steel Truss and Gusset Plate. Estimate of Roof covering materials. G.I. Roof, A.C. Roof. Estimate of steel frames for Doors & Windows. Estimate of Wooden Doors and Windows. Estimate of Roof Covering materials.

Unit 3 Estimate of Culverts & Bridges:
Estimate of Hume pipe culvert with splayed type of wing wall, Turn wall, face wall. Estimate of R.C.C. Slab Bridge, straight type wing walls.

Unit 4 Estimate of Water Supply and Sanitary Fittings:
Detailed Estimate of Water Supply for building work. Detailed Estimate of Sanitary works for building work. Estimate of S.W. pipe line. Estimate of Septic Tank.

Unit 5 Valuation & Rent Fixation:
Definition, Necessity of Valuation. Definition, Cost price, Value, Difference between them. Types of value, Book value, scrap value, salvage value, Market value, Depreciation, obsolescence, Sinking fund. Methods of calculation of depreciation, straight line method, sinking fund method constant percentage method, quantity survey method. Computation of capitalized value, Gross income, outgoing, net income, Years purchase. Types of outgoing and their percentages. Valuation of Lands & Buildings, factors affecting their valuation, Fixation of Rent as per PWD practice.

References

1. Estimating and costing By. B.N. Dutta, S.Datta & Co. Tagroe Path Motilal Bose Road, Lucknow
2. Estimating and costing & Valuation By Rangwala, Charotar Publications Station Road, Anand
3. Estimating & Costing By Birdie,J.C, Kapoor , Dhanpat Rai & Sons Delhi and Jullunder
4. Estimating & Costing Vol-I & Vol.-II By J.C. Malhotra, Khanna Publishers
5. Current Schedule of Rates from PWD/PHE/Irrigation Deptts.

List of Experiments

1. Use of different Schedule of Rates like .PWD.C.P.W.D. D.S.R.,RES, HOUSING BOARD , IRRIGATION & PHE
2. Estimating & abstract and rate analysis with the help of different software eg. QE-PRO, ESTIMATOR, & Print out of report .
3. Taking out quantities of following items for small R.C.C. Hall
   i) Concreting for footing, Column, Beam, slab.
   ii) Reinforcement for above items by preparing Schedule of bars.
   iii) Form work for all above items.
4. Preparing Rate analysis of following items: Building work – Brick work, P.C.C., R.C.C., Plastering, Flooring, Doors, Windows
5. Taking out quantities of Steel work for given shed supported on steel trusses & having GI sheet/profile sheet roofing
6. Taking out quantities of work for pipe culvert.(Drawings shall be provided for the above exercises by subject teacher.)

Unit 1 Introduction:
Types of sections used, Hollow Square section Rectangular section Tubular section, Z Section, Angle Section, T, I, C, L Section etc. Grades of steel and strength characteristics; advantages and disadvantages of steel as construction material; Use of steel table and relevant I. S. code; Types of loads on steel structure and its I. S. code specification.

Unit 2 Connections:
Riveted connections, Types of rivets and their use, Nominal dia, Gross dia. Unwin's formula, Pitch of rivets, Edge distance, Tacking rivets, permissible stress in rivet riveted joint and its failure, Strength of riveted joint and efficiency of a riveted joint. Assumptions in theory of riveted joint, Design of riveted joint for axially loaded member. Eccentric riveted connection Welded connection Introduction, Permissible stress in weld, strength of weld, advantages and disadvantages of welded joint. Types of weld and their symbols. Design of fillet weld and butt weld subjected to axial load.

Unit 3 Tension member:
Types of Sections used, Permissible Stresses in Axial Tension, gross and net cross sectional area of tension member, Analysis and design of tension member with welded and riveted connection.

Unit 4 Compression Member:
Criteria of failure of short column and long column, end conditions effective length of a column, slenderness ratio and corresponding compressive stress: Angle struts Types of sections used, Analysis and Design of axially loaded angle struts with welded and riveted connection. Stanchion and Columns, types of sections used, simple and built up sections. Analysis and design of axially loaded column. Design of compound column. Design of lacing angles and Batten plates.

Unit 5 Column Bases:
Types of column bases ,design of slab base & concrete block. Cleat angles, their use, introduction to gusseted base (no numerical problems on gusseted Base)

Unit 6 Steel Beams:
Different steel sections used; Simple and built-up sections Permissible bending stresses. Design of simple beams, check for shear only. Design of built-up beams (Symmetrical I Section with cover plates only), check for shear only, bending, bearing and deflection. Introduction to Plate Girder: Various components and their functions. (No numerical Problem on Plate Girder)

Unit 7 Roof Truss:
Types of steel roof truss & its selection criteria. span and slope, Rise and pitch, loads acting on the Roof. Dead load; Live load and wind load as per I.S. 875-1987. Combination of loads for design of truss, Forces in the members (Graphical method). Design of members oftruss, Design of Angle purlin as per I.S.06 16 .Arrangement of members.

Unit 8 Timber Structures:
Grades of Timber – stress in timber. Factors affecting stress/strength of timber. Design of Timber column & Timber Beam.

References

1. Steel structures By Ramanatham
2. Structural Engg. Vol.-IV (Steel) By Vazirani
3. Steel Structures By Ramchandra
4. Steel Structures By Arya and Ajmani
5. Steel Structures By Malhotra M.M.
6. I.S. Code 800-1984
7. Steel Structures By R.K. Dhoble & D.S.Dharmadhikari
8. Steel Structures By Neggi.

List of Experiments

Term work shall consists of sketch book and design report of steel roof truss for an industrial building. Sketch book shall consists of any five plates out of the below mentioned

1. Sketching of different types of riveted joints and welded joints. Typical sketches of sections of tension member, determination of net effective cross-sectional area of tension member for angle section.
2. Typical sketches of sections of compression member, lacing and battening.
3. Graphical solution of frames to find out the stress in the member. Type of trusses for different spans.
4. Working drawing of steel truss with the details of joint
5. Detailed drawing of slab base and gusseted base.
6. Important information of clauses of IS800-1984 and IS875 (Part-1,2 & 3)30

Sub Code: CED 604	Sub Name: PROJECT	10 Credits

1. **Introduction** : Importance of project work, guide line and general introduction

2. **Selection of Project:** The project can be selected from any four civil engineering system like Building construction system, transportation engineering system, irrigation engineering system. A topic for project can also be selected on recent development in civil engineering

3. **Planning of project:** Planning of field work, line of action, work distribution, data to be collected by different batches**.** projects to be undertaken by a group of 4 to 6 students

4. **The project report shall be in the following format:**
   - ☐ Topic and objectives
   - ☐ Collection of data, required survey work,
   - ☐ Management and construction procedure
   - ☐ Resources scheduling and networking
   - ☐ Design details
   - ☐ Required drawing set
   - ☐ Utility to society if any
   - ☐ Conclusion

LIST OF CIVIL ENGINEERNG PROJECTS:

1) Design of Check Dam/Stop Dam.
2) Study of G Dam (Earthen/Gravity)
3) Micro irrigation –Drip/Sprinkler Irrigation.
4) Junction planning for city roads/planning for roads for congested area/parking Studies etc.
5) Rain water harvesting for domestic or public building.
6) Campus development.
7) Interior decoration.
8) Concrete mix design.
9) Solid waste management.
10) Hospital waste disposal.
11) Recycling of resources.
12) Manufacturing of Pre cast concrete products.
13) Prestressed concrete.
14) Non conventional sources of energy.
15) Concrete pipe manufacturing unit.
16) Planning Estimating and design for residential apartments/commercial complex.
17) Planning and design of water treatment plant for given data.
18) Planning and design of water supply scheme for given lay out.
19) Planning and design of sewage treatment plant for given data.
20) Planning and design of sanitary scheme for given lay out.
21) Intelligent & green building material.
22) Low cost housing project.
23) Planning and design of overhead water tank and sump well
24) Study of Lay out of small railway station.
25) Planning & design and estimation of roads (PMGSY/MGSX/BRTS)

Any other similar project can be selected.

Term Work: Shall consist of ----Detailed project report in above format. Separate drawing sheets covering details of the project shall also be prepared.

Sub Code: DE9999	Sub Name: PROFESSIONAL ACTIVITIES	0 Credits

Structured industrial visits shall be arranged and report of the same should be submitted by the individual student, to form a part of the term work. (Minimum 3 visits).

1. Following are the suggested type of Industries/ Fields -
   i) Visit to RCC framed structure building for details of reinforcement.
   ii) Visit to water /sewage treatment plant.
   iii) Visit to works carried out under watershed development/micro irrigation scheme.
   iv) Visit to any structure undergoing rehabilitation/retrofitting.

2. The Guest Lecture/s from field/industry experts, professionals to be arranged (2 Hrs duration), minimum 2 nos. from the following or alike topics. The brief report to be submitted on the guest lecture by each student as a part of Term work.
   a) HRD and civil engineering projects.
   b) Project planning and execution of civil engineering projects.
   c) PWD system of accounts
   d) Contract Management
   e) RCC design and detailing

3. Information Search ,data collection and writing a report on the topic
   a) Collection of data for valuation of old building
   b) Collection of details of BOT project under execution.
   c) Collection of Data and case study of failure of RCC structure.
   d) Collection of information on any topic from journal available in library.

4. The students should discuss in group of six to eight students and write a brief report on the same as a part of term work. The topic of group discussions may be selected by the faculty members. Some of the suggested topics are -
   a) Role of civil engineer in disaster management.
   b) Scope of out sourcing of civil engineering services.
   c) Pollution control.

5. Seminar Presentation**:** The students should select a topic for Seminar based on recent developments in civil engineering field, emerging technology etc.