BANGLADESH TECHNICAL EDUCATION BOARD

Agargaon, Dhaka-1207

4-YEAR DIPLOMA-IN-ENGINEERING PROGRAM

SYLLABUS (PROBIDHAN-2016)

CONSTRUCTION TECHNOLOGY

TECHNOLOGY CODE: **688**

5th SEMESTER

DIPLOMA IN ENGINEERING

PROBIDHAN-2016

CONSTRUCTION TECHNOLOGY (688)

5th SEMESTER

Sl. No	Subject Code	Name of the subject	T	P	C	Marks				Total
						Theory		Practical		
						Cont. assess	Final exam	Cont. assess	Final exam	
1	68851	Construction Methodology -II	2	3	3	40	60	25	25	150
2	68852	Estimation & Quantity Surveying -I	2	3	3	40	60	25	25	150
3	68853	Construction Engineering Drawing -II (CAD)	0	6	2	0	0	50	50	100
4	66453	Water Supply Engineering	2	3	3	40	60	25	25	150
5	66454	Theory of Structure	2	3	3	40	60	25	25	150
6	66456	Hydraulics	2	3	3	40	60	25	25	150
7	65851	Accounting Theory & Practice	2	3	3	40	60	50	0	150
Total			**12**	**24**	**20**	**240**	**360**	**225**	**175**	**1000**

68851	Construction Methodology - II	T	P	C
		2	3	3

AIMS

- To be able to understand the construction process of different types of floor.
- To be able to understand the construction process of uplifting (stair, ramp and Rain component of building).
- To be able to understand the construction process door, window & false ceiling roof.
- To be able to understand the methods and techniques used in construction of various kinds of bridges and culverts.
- To be able to understand the features, construction procedure and maintenance of flyover and tunnel.
- To be able to understand the features, construction procedure and maintenace of foot overbridge and underpass.

SHORT DESCRIPTION

Basement floor; Ground and upper floor; Ramp; Stair; Roofs; False ceiling; Doors; Windows; Form Work; Joint in Structure; Construction process of various kinds of bridges and culverts; flyover and tunnel; foot overbridge and underpass.

DETAIL DESCRIPTION

Theory:

1. Understand the construction procedure of basement floor.

1.1 State the meaning of basement floor.

1.2 Mention the function of basement floor.

1.3 Name the suitable materials used for the construction of basement floor.

1.4 Describe the construction procedure of the basement floor.

1.5 Different type of damp proofing of slab.

2. Understand the construction procedure of ground floor.

2.1 Mention the meaning of ground floor.

2.2 List the components of a ground floor.

2.3 Mention the essential requirements of a ground floor.

2.4 Name the suitable materials used for the construction of ground floor.

2.5 Describe the construction procedure of the following type of ground floors:

    a. Brick floor

    b. Brick concrete floor

    c. Terrazzo floor

    d. Mosaic floor

    e. Tiled floor

    f. Marble floor

    g. Timber floor

    h. Plastic floor

    I. Cork floor

    j. Glass floor

2.6   Mention the factors that affect the choice of materials to construction ground floors.

3. Understand the construction procedure of upper floors.
3.1   Mention the meaning of upper floor.
3.2   Distinguish between ground floor and upper floor.
3.3   Mention the essential requirements of upper floors.
3.4   Mention the factors to be considered for the construction of upper floor.
3.5   Describe the construction procedure of different types of upper floors.
3.6   Mention the advantages and disadvantages of the followings:
   a. Solid floor
   b. Hollow floor
   c. Composite floor.

4. Understand the construction principle of ramp.
4.1   State the meaning of ramp.
4.2   Mention the functions and location of ramp.
4.3   Mention the slope ratio in ramp.

5. Understand the construction principle of stairs.
5.1   Differentiate between stairs and staircase.
5.2   Mention the functions and location of stairs.
5.3   Define the technical terms used in stairs.
5.4   Name various types of steps according to shape and location.
5.5   Mention the relation between tread and riser.
5.6   Mention the relation between tread and riser.
5.7   List the suitable materials for construction of stairs.
5.8   Mention the classification of stairs.
5.9   Mention the suitability of each type of stair for specific use.
5.10   Describe a plan for a staircase of a building from a given stair hall and Room height.

6. Understand the construction principles of roofs.
6.1   List different kind of roofs.
6.2   Mention the function of a roof.
6.3   Mention the essential requirements of a good roof.
6.4   Differentiate between roof structure and roof covering.
6.5   Define the technical terms used in roof.
6.6   Mention the comparison of the advantages and limitations of flat roof over Pitched roof.
6.7   List the materials generally used for sloped roofs.
6.8   Mention the factors to be considered for selecting roof covering.

7. Understand the false ceiling and slab.
7.1   Mention the meaning of false ceiling.
7.2   Describe the function of false ceiling.
7.3   Mention the purpose of false ceiling.
7.4   List the materials generally used for false ceiling.
7.5   Describe the advantages of false ceiling.
7.6   Mention the meaning of false slab.
7.7   List the materials generally used for false slab.

8. Understand the construction of doors.

8.1   List different types of doors.

8.2   Identify the technical terms used in doors.

8.3   Mention the factors to be considered in determining the size of doors.

8.4   Describe various types of doors on the basis of their suitability and uses.

8.5   Mention the advantages and limitation of the following:
   a. Panel door
   b. Flush door
   c. Glazed door
   d. Louvered door
   e. Revolving door
   f. Sliding door
   g. Swing door
   h. Collapsible door
   i. Rolling shutter door
   j. Mild steel door
   k. Plastic door
   l. Aluminum door

8.6   Mention the general specifications for construction and workmanship of wooden frame of doors.

8.7   Describe the method of fixing door frames.

9. Understand the construction process of windows.

9.1   List different types of windows.

9.2   Mention the factors to be considered to determine the size, shape, location and Number of windows in a room.

9.3   Describe various types of windows on the basis of their suitability and uses.

9.4   Mention the advantages and limitations of the followings:
   a. Fixed window
   b. Pivoted window
   c. Sliding window,
   d. Steel casement window,
   e. Glazed or sash window
   f. Louvered window
   g. Bay window
   h. Clerestory window
   i. Corner window
   j. Dormer window
   k. Globe window
   l. Lantern window
   m. Aluminum window

9.5   Mention the functions of skylight, sunlight, fanlight and ventilator.

9.6   Describe the method of fixing windows.

9.7   Mention the comparison among the wooden, steel and aluminum glazed Windows.

9.8   Name different types of wood joints.

9.9   Identify important construction joint suitable for engineering works.

9.10 Mention the uses of wood joint.

10 Understand the Joint in Structure.

10.1 Mention the purpose of Joining.

10.2 Identify different types of Joint.

10.3 Expansion Joints.

a) Materials used for expansion joint.

b) Provision of Expansion joints in wall.

c) Provision of Expansion joints in roofs and floors.

d) Provision of Expansion joints in chajja balconies etc.

e) Provision of Expansion joints in verandah slab.

f) Provision of Expansion joints in framed structure.

10.4 Describe the construction procedure of the following types of joints.

a) Isolation joint.

b) Construction joints.

c) Sliding joints.

d) Floor Joints in large structure.

11 Understand the Form Work.

11.1   Define the form work.

11.2   Explain the requirements of form work.

11.3   List the materials generally used for form work.

11.4   Describe the procedure and Sketch of application of the following.

a.   Shuttering for Columns

b.   Shuttering for Beam and Slab Floor

c.   Form work for stairs

d.   Form work for walls.

11.5 Stripping time for Different type form work.

11.6 Describe the factors that should be considered during the supervision of good quality form work.

12   Understand the features of bridge and culverts.

12.1 Define Bridge and culverts.

12.2 Distinguish between bridge and culverts.

12.3 Mention the ideal site for construction of a bridge or culvert in roads and Highways.

12.4 Mention the classification of bridge and culverts.

12.5 Mention the factors which affect the choice and type of bridge or Culverts.

12.6 Define the terms:

(i)   Flood discharge

(ii) Water way

(iii) Scouring depth

(iv) Free board

12.7 Identify different parts of a bridge.

13   Understand the construction procedure and maintenance of bridge and culverts.

13.1 Describe the construction of wing wall and abutment of a bridge.

13.2 Explain the construction of deck slab.

13.3 Explain the term bridge management.

13.4 Explain the necessity of repair and maintenance of bridge and culverts.

13.5 Describe the procedure of repair and maintenance of bridge and Culverts.

14   Understand the features, construction procedure and maintenance of flyover.

14.1 Define flyover.

14.2 Mention the causes of flyover construction.

14.3   Mention the suitable location and site selection for flyover.

14.4 Describe the necessity and effect of flyover in metropolitan area.

14.5 Distinguish between bridge and flyover.

14.6 List about various equipment used in construct a flyover.

14.7 Mention about construction materials of flyover.

14.8 Mention the various construction procedure and steps to construct a flyover.

14.9 Describe about earthquake resisting and others security system in flyover.

14.10 Explain the necessity and procedure of repair and maintenance of flyover.

14.11 Explain the cause of failures of flyover.

14.12 Describe about future plan for flyover and traffic system in Bangladesh.

15 Understand the features, construction procedure and maintenance of tunnel.

15.1 Define tunnel.

15.2 Mention the purpose and utility of tunnel.

15.3 Mention the suitable location and site selection for tunnel.

15.4 Distinguish between tunnel and bridge.

15.5 Explain the advantage and disadvantages of tunnel.

15.6 Describe the usages and necessity of tunnel in modern life.

15.7 Describe about various equipment's used in construct a tunnel.

15.8 Mention about construction materials of tunnel.

15.9 Mention the various construction procedure and steps to construct a tunnel.

15.10 Describe about earthquake resisting and others security system in tunnel.

15.11 Explain the procedure of maintenance of tunnel.

15.12 Describe the necessity of tunnel in Bangladesh.

16 Understand the features, construction procedure and mmaintenance of foot over bridge and underpass.

16.1 Define foot over bridge and underpass

16.2 Describe about various kinds of foot over bridge and underpass.

16.3 Mention the purpose and utility of foot over bridge and underpass

16.4 Mention the points to be considered in selecting the suitable location and site for a foot over bridge

16.5 Describe the necessity and effect of foot over bridge and underpass in busy   traffic road.

16.6 Mention about construction materials of foot over bridge and underpass and describe construction procedure.

16.7 Explain the cause of failures and remedies of foot over bridge and   underpass.

16.8 Mention the differences between foot over bridge and underpass.

16.9 Explain the necessity and procedure of repair and maintenance of foot over

PRACTICAL:

1. Perform the construction of one of the following floors with suitable materials:

a. Brick floor	b. Brick concrete floor	c. Terrazzo floor
d. Mosaic floor	e. Tiled floor	f. Timber floor

g.   RCC solid floor   h.   RCC ribbed floor

1.1 Select the required tools and raw materials.

1.2 Prepare the floor according to standard specification.

1.3 Clean the work site.

2 Perform a case study of dampness in building.

2.1   Identify a damped building.

2.2   Investigate the reasons of dampness.

2.3   Select the method of damp proofing.

2.4   Estimate the materials to be needed for damp proofing.

2.5   Prepare a report on the specified case of dampness in building.

3 Perform the construction of the form work of a stair.

3.1   Collect the required tools and raw materials.

3.2   Draw a neat sketch of stair (at least ten nos. steps).

3.3   Make the bottom supports and erect inclined way.

3.4   Fix the steps and side of steps.

3.5   Check the accuracy of the works.

4 Perform the preparation of the detail drawing of any one of the following doors:

a. Paneled door	b. Glazed door	c. Louvered door
d. Revolving door	e. Sliding door	f: Swing door
g. Collapsible door	h. Rolling shutter door	i. Mild steel sheet door
j. Plastic door	k. Aluminum door	

5 Perform the preparation of the detail drawing of any one of the following windows:

a. Fixed window	b. Pivoted window	c. Sliding window
d. Casement window	e. Glazed or sash window	f. Louvered window
g. Bay window	h. Clerestory window	i. Corner window
j. Dormer window	k. Gable window	l. Lantern window
m. Metal window	n. Aluminum window	

6   Perform the construction of any one of the following shores:

a. Raking shore   b. Flying shore   c. Dead shore

6.1   Collect the required tools and raw materials.

6.2   Assemble the different members of the shore as per standard specifications.

6.3   Check the stiffness / rigidity of the shore.

6.4   Disassemble all the members of the shore.

6.5   Store the materials used.

7   Perform the preparation of a single layer and double layers scaffolding.

7.1   Collect the required tools and raw materials.

7.2   Erect the vertical members.

7.3   Place the horizontal members and tied with jute rope.

7.4   Place the boards for platform.

7.5   Provide the bracings accordingly.

7.6   Check the properness of the scaffolding work.

7.7   Disassemble all the members and store the materials used.

8   Perform the preparation of form works for columns and beams.

8.1   Collect the required tools and raw materials.

8.2   Make the boards according to required size.

8.3   Erect the boards and attached accordingly so that they can easily remove.

8.4   Check the dimensions of the column / beam.

8.5   Disassemble the form works and store the materials used.

9   Perform the routine maintenance of bridge and culvert.

9.1   Select a bridge or culvert to be used for maintenance purpose.

9.2   Identify the components of the bridge to be repaired.

9.3   Prepare a repair and maintenance profile for the bridge.

9.4   Select and collect the materials necessary for the job.

9.5   Do the repair and maintenance work according to the profile?

10 Perform the identification of different types of bridge and culverts and their components.

10.1   Identify different types of bridge.

10.2   Identify different types of culverts.

10.3   Draw different types of bridge.

10.4   Draw different types of culverts.

10.5   Draw the detailed drawings of the components of bridge and culverts.

11 Visit the following projects and collect data relating to the socio-economic aspects of the project for writing a report:

a)   Bridge project.   b) Over bridge project.   c) Underpass project.

d)   Flyover project.   e) Tunnel project.

REFERENCE BOOKS

1. Building Construction   -   B C Punmia

2 .A Text Book of Construction   -   S P Aurora & S P Bindra

3. Building Construction   -   G J Kulkarni

4. Building Construction   -   S C Rangwala

5. Construction Technology   -   j.t. grundy volume 1 & 2

68852   Estimation & Quantity Surveying-1   T   P   C
<div align="right">2   3   3</div>

AIMS

- To provide the ability of quantity analysis of construction engineering works.
- To enable to estimate volume quantity of materials used in construction works.
- To provide understanding cost able to improve knowledge and skill of estimating two storied building consisting of spread footing.
- To develop skill in estimating RCC and bituminous road.
- To be able to understand the estimating of roof truss & deep tube well.

SHORT DESCRIPTION

Introduction to estimating, quantity estimation of excavating tank, road, embankment, canal digging, steps, boundary wall, bituminous & RCC road, Complete estimate of a single storied two roomed building with verandah and Two storied building with verandah, roof truss, deep tube well, Rate analysis.

DETAIL DESCRIPTION

Theory:

1. Understand the basic concept of estimating.

    1.1 Define the term estimating.

    1.2 State the methods of estimating.

    1.3 Mention the rules and methods of measurements of works.

    1.4 Mention the rules of deduction for opening, bearing etc. in masonry.

    1.5 List unit weight of different materials used in construction works.

    1.6 Write unit of different items of works as per standard practice.

2. Estimate the volume of earth work for road work for excavating a tank.

    2.1 Mention the rules of finding out the volume of earth work by mid area method.

    2.2 Mention the rules finding out the volume of earth work by mean area method.

    2.3 Mention the rules finding out the volume of earth work by primordial method.

    2.4 Calculate the volume of earth work in excavating pond of a given cross-section by mid area method, mean area method & prismoidal method.

3. Estimate the volume of earth work for road embankment.

    3.1 Identify the side slopes for different heights of road embankment.

    3.2 Identify the cross section of road embankment.

    3.3 State the method of finding out the volume of earth work in embankment by mid area method.

    3.4 State the method of finding out the volume of earth work in embankment by mean area method.

    3.5 State the method of finding out the volume of earth work in embankment by Primordial method.

    3.6 Calculate the volume of earth work of 100m long embankment by mid area method, mean area method & prismoidal method.

4. Estimate the volume of earth work for canal digging.

    4.1 Identify the cross section of partly banking and partly cutting.

    4.2 Explain the method of finding out volume of earth work for partly banking and partly cutting.

    4.3 Explain the terms lead and lift.

    4.4 Determine the rate of different categories of labour considering the work site including lead and lift.

5. **Estimate the different quantities of items of work in steps, boundary wall and roads.**
    5.1 Identify different parts of steps.
    5.2 List different items of works in a boundary wall.
    5.3 List different items of works in a bituminous road.
    5.4 List different items of works in a RCC road.

6. **Understand the procedure of estimating a simple building.**
    6.1 State center line and separate wall method.
    6.2 Mention the advantage and disadvantage of center line and separate wall methods.
    6.3 Explain the methods of deduction for opening or over lapping.
    6.4 Define the terms sub-structure and super-structure.
    6.5 Explain the dimensions length, breadth and height or depth of any section.
    6.6 Identify main wall, partition wall, outer wall, inner wall, parapet wall etc.
    6.7 Identify RCC work in lintel, beam, stair, floor/roof slab, sunshade, shelve, railing, drop wall etc.
    6.8 List different sizes of doors and windows.
    6.9 List the number of ventilators required.
    6.10 Identify the items of work for civil construction.
    6.11 Calculate the amount of cement, sand and brick, required for 10 cum masonry work using 1:4 proportion of mortar.
    6.12 Calculate the amount of cement, sand and brick, required for 10 cum masonry work using 1:6 proportion of mortar.
    6.13 Calculate the amount of cement, sand and brick, required for 10 sqm masonry (125mm thick wall) using 1:4 proportion of mortar.

7. **Understand the estimate of roof truss (wooden & steel).**
    7.1 State the purpose of roof truss.
    7.2 State the way of calculating the quantities of wood required in a roof truss.
    7.3 State the way of calculating the quantities of steel required in a roof truss.
    7.4 Mention the standard lapping at end & sides of CI sheet for roofing.
    7.5 State the way of calculating the quantities of CI sheet for roof covering.
    7.6 State the way of calculating the quantities of GI ridding.
    7.7 State the way of calculating the painting works of roof truss.

8. **Understand the estimate of sinking deep tube well.**
    8.1 State the meaning of deep tube well.
    8.2 List the various accessories required for sinking a deep tube well.
    8.3 Mention the different sections of a deep tube well.
    8.4 Describe the step by step procedure reverse circulation method of sinking a deep tube well.
    8.5 State the method of calculating the quantities of materials required for a deep tube well.
    8.6 State the meaning of commissioning deep tube well.
    8.7   calculate the costing of sinking deep tube well step by step

9. **Understand the basic concept of rate analysis.**
    9.1 State meaning of rate analysis.
    9.2 Explain the purposes of rate analysis.
    9.3 Explain the terms, contractors profit, overhead charges, contingency sundries and lumsum.
    9.4 Mention the advantage of rate analysis to prepare cost estimate.
    9.5 Calculate the analysis of rates for different items of building works.

PRACTICAL:

1. Prepare an estimate for construction of underground water reservoir.
2. Prepare an estimate for construction of 100m long boundary wall.
3. Prepare an estimate for making wooden chair, table and almirah.
4. Prepare an estimate for construction of 100m long bituminous road.
5. Prepare an estimate for construction of 100m long RCC road.
6. Calculate the quantity of following works for two storied building with verandah.
   6.1 Earth work in excavation of foundation trenches.
   6.2 One layer brick flat soling in foundation a floor.
   6.3 Cement concrete work (1:3:6) in foundation a floor.
   6.4 Brick work (1:6) in foundation (Sub-structure) up to plinth level.
   6.5 Earth work in filling the sides of foundation trenches and plinth.
   6.6 Damp proof course (DPC) below super structure wall.
   6.7 Brick work (1:6) in super structure.
   6.8 125mm thick Brick work (1:4) in partition wall.
   6.9 RCC work (1:2:4) in lintel, beams, roof slab, stair, sunshade and drop wall.
   6.10 Mild steel bar reinforcement fabrication in different RCC works when percentage given.
   6.11 6.11 Wood work in door and window frames.
   6.12 6.12 Wood work in door and window shutters. Grill work for windows.
   6.13 Pre-cast RCC ventilator.
   6.14 Cement plaster to both sides of brick wall.
   6.15 Cement plaster to plinth wall and skirting with neat cement finishing (NCF).
   6.16 Patent stone flooring (PSF).
   6.17 Lime terracing over RCC roof slab.
   6.18 White washing/distempering.
   6.19 Plastic emulsion paint to walls and ceiling.
   6.20 Color washing/snowcem washing/weather coat.
   6.21 Synthetic enamel painting to doors and windows.
7. **Prepare an estimate of a wooden truss with CI sheet roofing.**
   7.1 Select a detail drawing of a king post roof truss.
   7.2 Determine the length & sizes of different members of the truss.
   7.3 Calculate the quantity of wood required for the truss in cum.
   7.4 Determine the measurements of roofing area of the truss.
   7.5 Calculate the quantity of CI sheet roofing in bundle / sqm.
   7.6 Calculate the quantity of GI ridging in m.
   7.7 Calculate the quantity of painting works of the truss.

8. **Prepare an estimate of a steel truss with CI sheet roofing.**
   8.1 Select a detail drawing of a steel truss.
   8.2 Identify the length sizes & thickness of different members of the truss.
   8.3 Determine the measurements of each of the member of the truss.
   8.4 Calculate the total quantity of steel required in kilogram/quintal/ton.
   8.5 Determine the measurements of roofing area of the truss.
   8.6 Calculate the quantity of CI sheet roofing in bundle/ sqm.
   8.7 Calculate the quantity of GI ridging in rm.
   8.8 Calculate the quantity of painting works of the sleet truss.

REFERENCE BOOKS

1. Estimating and costing – B N Datta
2. Estimating and costing – Gurucharan Singh

68853   Construction Engineering Drawing -2 (CAD)   T P C
                                                       0 6 2

AIMS:
- To be able to understand Auto-CAD.
- To be able to develop skill in Auto-CAD command.
- To be able to develop knowledge, skill and attitude of applying various Auto-CAD command in Architectural drafting.
- To be able to develop knowledge, skill and attitude of working drawing in Auto- CAD.
- To be able to develop knowledge, skill and attitude of drawing in Auto-CAD.

SHORT DESCRIPTION

Drawing environment and drawing aids, Drawing technique of geometrical object, Editing and modifying the drawing, dimension of the drawing, Display and view the drawing, layers, Display and view the drawing, hatch **,** Text , Working drawing of frame structure of multi storied residential building in Auto CAD, 3D Drawing in AutoCAD. Perspective view rendering, lighting and imaging in Auto CAD, plotting and printing of 3D view in Auto CAD.

PRACTICAL:

1. Set up the drawing environment and drawing aids.
   1.1   Start a CAD package and identify different areas of CAD screen.
   1.2   Use the menu bar, command prompt area, toolbox, units and drawing aids.
   1.3   Set up the drawing area and paper size.
   1.4   Use the drawing aids.
   1.5   Save the drawing environment.
   1.6   Identify different menus and dialog boxes of CAD packages.
   1.7   Exits from the CAD.

2. Perform the construction of the geometrical shape or objects.
   2.1   Use the commands to draw lines and rectangles using polar and rectangular Coordinates.
   2.2   Create the pline and spline using single and 3D POLY commands.
   2.3   Draw the circle, arc, dome and ellipse.
   2.4   Connect two lines, arcs, circles with fitted arc.
   2.5   Draw the simple construction lines.

3. Perform Edit and modify the objects.
   3.1   Select and erase the objects using different technique.
   3.2   Duplicate the objects using copy/grips, offset, and mirror and array command.
   3.3   Rearrange the objects using move and rotate commands.
   3.4   Resize the objects using stretch, scale, extend, trim and length commands.
   3.5   Break the objects.
   3.6   Explore the objects.
   3.7   Chamfer and fillet the objects.

4. Setup the dimension of the drawing.
   4.1   Use the commands to set up the dimension variables and scale.

4.2 Create the linear, angular, diameter, radius and ordinate dimensions.

4.3 Dimension the multiple objects.

4.4 Edit the dimensions.

4.5 Create the leads and annotations.

5. Organize the drawing information on layers.

5.1 Identify the layer control options.

5.2 Create and name the layers.

5.3 Make the layer current and control layer visibility.

5.4   Freeze, lock and unlock the layers.

5.5 Set the layer color and line type.

6. Display and view the drawing.

6.1 Redraw and regenerate a drawing.

6.2 Move around within a drawing using pan and zoom command.

6.3 Change the magnification of the drawing using zoom in/out/all etc.

6.4 Use the aerial view, named view and multiple view ports.

7. Fill the drawing area with hatch patterns.

7.1 Identify the hatch patterns with CAD.

7.2 Add the default hatch pattern area of a drawing.

7.3 Create the custom hatch patterns.

7.4 Control the appearance (i.e. size or scale) of the hatch patterns.

7.5 Select or define the hatch boundaries.

8. Work with the text.

8.1 Create the line text.

8.2 Create the paragraph text.

8.3 Edit and change the text.

8.4 Check the spelling.

8.5 Insert the text from the outside of CAD.

8.6 Work with the text style.

9. Perform the preparation of working drawing of multi-storied residential Building.

9.1 Use the menu bar, command prompt area, toolbox, units and drawing aids.

9.2 Set up the drawing area and paper size.

9.3 Draw ground floor plan with all dimensions in different layer.

9.4 Draw typical floor plan with all dimensions in different layer.

9.5 Draw front and side elevations using different layer line type color and hatch.

9.6 Draw section through staircase with all detail dimensions.

10.   Perform the preparation of detail architecture drawing of multi-storied Residential building.

10.1   Draw detail toilet plan using different layer, fine type and color.

10.2   Draw detail section of toilet.

10.3   Draw detail kitchen plan using different layer, line type and color.

10.4   Draw detail section of kitchen.

10.5   Draw detail plan of a locker.

10.6   Draw detail section of a locker.

11. Perform the preparation of detail structural drawing of multi storied Residential building.

11.1   Draw the detail plan and section of independent column footing.

11.2 Draw the detail long and cross section of rectangular beam.

11.3 Draw the detail plan and section of one way slab using different layer Line type and color.

11.4 Draw the detail plan and section of two slabs using different layer, line Type and color.

11.5 Detach the reinforcement detail of stair.

11.6 Print the drawing.

12. Prepare 3D object in Auto CAD.

12.1 Create simple object in Auto CAD.

12.2 Draw isometric view using snap and Isoplane command.

12.3 Create 3D surface by using 3D poly, Edge surf, Rule surf, Tab surf and Mesh.

12.4 Edit / draw 3D object using polar co-ordinate system.

12.5 Edit 3D object different editing command i. e. align, rotate 3D, array 3D,Mirror 3D, move, chamfer, fillet, trim etc.

13. Prepare Building Plan By Using Auto-CAD.

13.1   Prepare a multi storied Building Plan by Using Auto-CAD.

13.2   Convert the Building plan in 13.1 into 3D.

14. Understand the perspective view rendering, lighting and imaging in Auto CAD.

14.1 List the uses of co-ordinate system in Auto CAD.

14.2 Explain the setup of co-ordinate system in auto CAD.

14.3 Mention the use of surface modeling.

14.4 Describe how to create surface modeling.

14.5 Explain how to create perspective view.

14.6 Mention the use of distance and camera in perspective view.

14.7 Describe the rendering and materials effect in 3D.

14.8 List the uses of background in 3D.

14.9 Describe the setup of background in 3D.

15. Understand the plotting and printing of 3D view in Auto CAD.

15.1 Describe the importance of printing of 3D view.

15.2 Explain how to select the output format 3D.

15.3 Express the setup technique of printing options.

15.4 Describe the set up technique of plotting.

REFERENCE BOOK:

1. Mastering AutoCAD (Bangla Version) - Engr. Samuel Mallik

2. Auto-CAD – Engr. Md. ShahaAlam.

3. Mastering AutoCAD - George Omura

66453   Water Supply Engineering   T P C
    2 3 3

AIMS

- To enable to select suitable methods for collection and distribution of water from given source to given community.
- To enable to identify impurities of water of given sources and selected suitable method/methods of purification up to potable standard.
- To assist in comparing various types of water pipes and pipe fittings.
- To develop understanding of the procedure of construction, repair, replacement and maintenance of water supply systems.
- To provide understanding of the socio-economic aspect of water supply and sanitation (WSS).

SHORT DESCRIPTION

Introduction; Water requirements; Sources of water; Water pipes; Collection and transmission of water; Quality of water; Treatment of water (clarification); Treatment of water (filtration); Treatment of water (disinfection and softening); Miscellaneous water treatment; Water distribution; Water reservoir; Distribution system; Rural water supply system; Plumbing system.

DETAIL DESCRIPTION

Theory:

1. **Understand the concept of water supply engineering.**
   1.1 Define water supply engineering.
   1.2 Explain the scope of water supply engineering.
   1.3 Describe the importance and necessity of planned water supply.
   1.4 Describe the water supply and its impact on public health and environment.
   1.5 Explain the components of water supply system (Rural and Urban).

2. **Understand the various aspects of consumption of water.**
   2.1 Describe population prediction and various methods of population forecast.
   2.2 Describe the various needs for clean water and list the quantities required for those purposes.
   2.3 Explain the influence of the factors which affect per capita consumption of water:
       a. Size of city
       b. Characteristics of population
       c. Industries and commercial organization
       d. Climatic condition
       e. Metering of water
   2.4 Explain the demand of water for fire fighting and fire stand post.

3. **Understand the different sources of water.**
   3.1 Identify different sources of water.
   3.2 Explain the hydrological cycle.
   3.3 State the advantages and disadvantages of ground water.
   3.4 Mention the advantages and disadvantages of surface water.

3.5 Distinguish between the ground water supply and surface water supply in respect to quality of water.

3.6 Explain rainwater harvesting

4. Understand the different type of pipes & pipe joints used in water supply and the reasons for corrosion in metal pipes.

4.1 Classify the different type of pipes according to size, materials, quality, and allowable stresses used in Bangladesh.

4.2 Explain the causes of corrosion of metal pipes.

4.3 Describe the methods of prevention and protection against corrosion.

4.4 Explain the causes of deterioration in non-metal pipes.

4.5 Describe with sketches the different joints used in pipes.

4.6 Describe with sketches the fittings of pipes and valves used.

5. Understand the collection and transmission system of water.

5.1 Identify the different types of intake used in collecting surface water.

5.2 Describe the different intake systems with sketches.

5.3 Classify the different type of pumps used in water supply.

5.4 Explain the uses and limitations of different type of pumps.

5.5 Distinguish between turbine pump and submersible pump used in deep tube well.

6. Understand the safe water and various types of impurities in water.

6.1 Define safe water

6.2 Mention the common water borne diseases.

6.3 Describe the contamination of water due to cross connection and plumbing defects, storage and back syphonge.

6.4 State the different type of impurities present in water.

6.5 Explain the causes of turbidity, color, taste and odor in water.

6.6 Mention the effects and maximum allowable limits (WHO & BSTI) of impurities (pH, colour, Turbidity, TDS, SS, Hardness, chloride, Nitrate, Iron, Sodium, Arsenic, Cadmium, lead, total coliform and faecal coliform) in water.

6.7 Explain the causes and effects of alkalinity, acidity and hardness in water.

6.8 Describe the effects of gaseous impurities (carbon di-oxide, hydrogen sulphide, dissolved oxygen) in water.

6.9 Mention the causes and effects of nitrate (methemoglobinemia) and lead poisoning (plumbism) in water.

7. Understand the treatment of water by clarification.

7.1 Explain a typical flow diagram of treatment plant units.

7.2 Outline the need of screening of water.

7.3 Mention the principle of plain sedimentation.

7.4 Mention the principle of sedimentation with coagulation.

7.5 State different types of coagulants with their purpose and action.

7.6 Describe the process of flocculation.

7.7 Describe a typical sketch of sedimentation tank.

8. Understand the treatment of water by filtration.

8.1 Explain the need of filtration of water.

8.2 State the theory of filtration of water for bacteriological removal.

8.3 Explain the characteristics between the slow sand filter and rapid sand filter.

8.4 Describe the operation difficulties of slow sand and rapid sand filters.

8.5 State the meaning of negative head and mud balls.

9. **Understand the treatment of water by disinfection and softening.**

9.1 Describe disinfection of water by chlorination.

9.2 Explain the advantages and limitations of disinfection of water by   chlorination.

9.3 Compare the pre-chlorination, post chlorination, double chlorination and super chlorination.

9.4 Explain the advantages of break point chlorination.

9.5 Describe the following methods of disinfection of water:

      a.   Heating and boiling

      b.   pH control

      c.   Using oxidizing agent

      d.   Ultra violate Ray

      e.   Ozone

9.6 Distinguish between hard and soft water.

9.7 List different processes of water softening.

10. **Understand the different processes of removing color, odor, taste, arsenic, iron, manganese and salinity.**

10.1 Explain the purpose of aeration.

10.2 Describe the different methods of aeration.

10.3 Describe the process of removal of color, odor and taste by activated carbon.

10.4 Explain the different methods of removing arsenic, iron and manganese with flow diagram.

10.5 List the different methods of desalination of water.

11. **Understand the different water distribution methods, construction and maintenance.**

11.1 State the different features of the distribution systems.

11.2 Describe with the help of sketches the different methods of supply of water.

11.3 Outline the advantages and disadvantages of different methods of supply of water.

11.4 Describe with sketches the different layout methods of distribution pipes.

11.5 Explain the relative advantages and disadvantages of different layout methods of distribution pipes.

11.6 State the different types of-

    a. Meter

    b. Valves

    c. Fire hydrant

    d. Pipe & Fittings.

11.7 Describe the procedure of excavation and back filling for laying pipe lines.

11.8 Describe the procedure for-

    a. handling and laying pipes and their maintenance

    b. placing and maintenance of hydrants and valves

    c. cleaning of water mains and use of washout system.

12. **Understand different types of reservoir.**

12.1 Mention the different types of reservoir according to position and shape.

12.2 Explain the needs of roof tank and typical water reservoir in a building.

12.3 Describe the typical section of roof tank and water reservoir in a building.

13. **Understand the water supply systems with specific reference to rural Bangladesh**

13.1 Give introduction to different types of hand pumps: No. 6 hand pump, deep-set (Tara) pump.

13.2 Describe the procedure of drilling, aquifer selection, back filling and installation techniques including developing of new tube well.

13.3 Explain the design procedure of tube well strainer.

13.4 Describe operation & maintenance of No. 6 hand pumps and deep-set (Tara) hand Pumps.

13.5 Explain the drilling problems in rocky areas.

13.6 Give introduction to alternative technologies in problem areas of Bangladesh: Shallow Shrouded Tube well (SST), Very Shallow Shrouded Tube well (VSST), Pond Sand Filter (PSF), Infiltration Galleries (IG), Iron Removal Unit (IRU) and Deep-set technologies.

14. Understand the importance of plumbing system.

14.1 Define plumbing system.

14.2 List the requirements of plumbing installation.

14.3 Identify with sketches the various plumbing fittings and fixtures.

14.4 Describe the uses of various plumbing fittings and fixtures.

14.5 Differentiate between plumbing fittings and fixtures.

14.6 List the tools required for plumbing works.

14.7 Mention the uses and maintenance of various plumbing tools.

15. Understand the effect of socio-economic factors on water supply and sanitation.

15.1 Describe the socio-economy of rural and urban area in Bangladesh.

15.2 Give definitions of demographic characteristics, power structure, cultural Issues (traits), rural leadership and local government structure.

15.3 Describe the influence of socio-economic aspects on community water Supply and sanitation.

PRACTICAL:

1 Identification of pipes and fittings.

1.1 Identify physically different type of pipes, fittings and joints.

1.2 Draw the sketches of typical plumbing fittings.

1.3 Cut pipes and cut a thread on the pipe.

1.4 Inspect installations to identify good and poor quality materials and workmanship

2 Demonstration of water purification plant and deep tube well.

2.1 Draw flow diagram of water purification processes after visiting a plant.

2.2 Draw section through a deep tube well.

2.3 Identify the major precautions needed during installation and use of deep tube well.

3 Maintenance works.

3.1 Identify, take out and replace unserviceable fixtures/ fittings or any other component parts.

3.2 Identify the common troubles of submersible pump and their solutions after visiting pump house.

3.3 Identify the common troubles in water supply pipe lines and their solution by visiting concern authorities (WASA, City Corporation and Pourashava).

4 Conduct physical and chemical tests of water.

4.1 Conduct physical tests of water (pH value & turbidity) using field pH and turbidity meter.

4.2 Conduct chemical tests of water (iron, manganese and chloride) using field kits.

4.3 Conduct the arsenic test of water using field kits.

4.4 Conduct residual chlorine test using field kits.

4.5 Conduct hardness test using field kits.

5 Physically identify different parts of
    a) No. 6 hand pump,
    b) Deep-set (Tara) hand pumps.
    c) Submersible pump

6 Inspect installation of
    a) No. 6 hand pump,
    b) Deep-set (Tara) hand pumps.
    c) Submersible pump

REFERENCE BOOKS

1. Rangawala, S.C(2009): Water supply and sanitation. (Environmental Engineering)
2. Azizul, Syed Haq (2006): Plumbing Practices.
3. Feroze, M. Ahmed & Mujibur, M. Rahman (2000): Water Supply & Sanitation: Rural And Low Income Urban Communities, ITN-Bangladesh Publication.
4. Plumbing (1991): Technical Teachers Training College Publication.
5. Aziz, M.A (1975) : Water supply and sanitation.

66454   Theory of Structure   **T P C**
                                                          2 3 3

AIMS

- To be able to consolidate and extend the fundamental understanding of the behavior of statically determinate structures i.e. beams, frames etc.
- To be able to develop of awareness of structural behavior such as deflection and stability of masonry dam.
- To be able to develop understanding for selection of suitable section of beam and member of the truss.

SHORT DESCRIPTION

Shear force and bending moment of beams; Stresses in beams; Deflection of beams; Joints and connections; Forces in frames; Steel structure; Masonry dam; Column; Moving loads; Thin Cylindrical shells.

DETAIL DESCRIPTION

Theory:

1. Understand shear force and bending moment of beams.
    1.1 Define determinate, indeterminate and homogeneous structure.
    1.2 Mention different types of support condition.
    1.3 Explain the relations between shear force and bending moment.
    1.4 Define dangerous section and point of contra flexure.
    1.5 Solve problems on SF and BM of cantilever beam with concentrated load, distributed load, inclined load and combined loads.
    1.6 Solve problems on SF and BM of simply supported beam with concentrated load, distributed load, inclined load and combined loads.
    1.7 Solve problems on SF and BM of overhanging beam with concentrated load, distributed load, inclined load and combined loads.

2. Understand the bending stresses in beams.
    2.1 State the meaning of bending stresses in beam.
    2.2 List the assumptions of bending stresses in beam.
    2.3 Differentiate between bending moment and bending stress.
    2.4 Express and derivation of the formula for bending stress.
    2.5 State the meaning of elastic section modulus.
    2.6 Solve problems on section modulus of circular, rectangular, I, T, L and hollow sections of beams.
    2.7 Solve problems on bending stresses of circular, rectangular, I, T, L and hollow sections of beams.

3. Understand the shearing stresses in beams.
    3.1 State the meaning of shearing stresses in beam
    3.2 Differentiate between maximum and average shear stress.
    3.3 Relate maximum shear stress and average shear stress for rectangular, circular and triangular section.
    3.4 Express the derivation of the formula for shearing stress.
    3.5 Solve problems on shearing stresses of circular, rectangular, I , T, L and hollow sections of beams.

3.6 Determine the section of homogeneous beam with respect to shearing stress and bending stress.

4. Understand the deflection of beams.

4.1 Define the meaning of deflection of beam and elastic curve.

4.2 List the assumptions of deflection of beam.

4.3 State the maximum allowable deflection for RCC beam, RCC slab and steel beam.

4.4 Express the derivation of equation for elastic curve

4.5 State the 1st and 2nd area moment proposition.

4.6 Compute the slope of elastic curve for cantilever beam with concentrated and distributed load.

4.7 Compute the maximum deflection for cantilever beam with concentrated and distributed load.

4.8 Compute the slope of elastic curve for simply supported beam with symmetrically concentrated and distributed load.

4.9 Compute the maximum deflection for simply supported beam with symmetrically concentrated and distributed load.

5. Understand the concept of steel structure and joints.

5.1 Define steel structure.

5.2 Describe joint and connections of steel structure.

5.3 State the differences between cold rolled and build up section.

5.4 Name the elements of pre-fabricated building.

5.5 Define pitch, back pitch and repeating section.

5.6 State the necessity of joints.

5.7 Classify joints and state efficiency of joints.

5.8 Explain the modes of failure and remedial measures of riveted joints.

5.9 Solve problems on simple lap joint and butt joint subjected to axial load only.

6. Understand the significance of welded connections.

6.1 Define terms: Fillet, Leg, Throat.

6.2 State the significance of welded connections.

6.3 Classify different types of welded connections.

6.4 Mention the merits and demerits of welded connections.

6.5 Solve problems on fillet weld connection subjected to axial load only.

6.6 Solve problems on butt weld connection subjected to axial load only.

7. Understand the action of forces in steel frames.

7.1 Define the terms: truss, tie, strut, redundant, deficient, web and chord member, perfect, imperfect frame.

7.2 Mention different types of roof trusses, bridge trusses and beams.

7.3 State the fundamental assumptions in trusses.

7.4 Describe the methods of computing forces in trusses.

7.5 Determine the forces on frames for warren truss, cantilever and Howe truss with dead load by Analytical (joint and moment) method.

7.6 Determine the forces on frames for warren truss, cantilever and Howe truss with dead load by graphical method.

8. Understand the stability of masonry dam.

8.1 Define dam and mention the functions of a dam.

8.2 Mention the different types of dam.

8.3 Explain the stability of a masonry dam.

8.4 State the meaning of middle third law.

8.5 Express the derivation of the equation for minimum width of the base for just no tension.

8.6 Calculate the maximum and minimum pressure on the foundation bed for rectangular dam

8.7 Calculate the maximum and minimum pressure on the foundation bed for trapezoidal dam having water face vertical only.

8.8 Solve problems on stability of the dam.

9. Understand the elastic buckling of columns.

9.1 State the meaning of short and long column.

9.2 Mention the type of columns on the basis of end conditions.

9.3 Compare the equivalent length of different columns.

9.4 Interpret the Euler's formula for flexural buckling of a pin ended strut/column.

9.5 Calculate the safe load on column using Euler's formula.

9.6 State the Rankin-Gordon formula.

9.7 Calculate the safe load on column using Rankin-Gordon formula.

10. Understand the concept of moving loads.

10.1 State the meaning of moving load.

10.2 Classify different types of moving loads.

10.3 State the meaning of influence line.

10.4 Draw influence line for single concentrated load and reaction of a simply supported beam.

11. Understand the concept of Thin Cylindrical Shells.

11.1 Define cylindrical shell.

11.2 Failure of a cylindrical shell due to an internal pressure.

11.3 Stresses in a thin cylindrical shell.

11.4 Circumferential stress.

11.5 Longitudinal stresses.

11.6 Design of thin cylindrical shells

PRACTICAL:

1. Determine shear force & bending moment at different sections of simply supported beam with different types of load and draw the diagrams.

2. Determine shear force & bending moment at different sections of overhanging beam with different types of load and draw the diagrams.

3. Determine the position of dangerous section and inflection point or point of contra flexure of overhanging beam and show in diagram.

4. Determine the bending stresses of circular, rectangular & hollow sections of beams and draw the diagrams.

5. Determine the bending stresses of I, T, L sections of beams and draw the diagrams.

6. Determine the shearing stresses of circular and rectangular sections of beams and draw the diagrams.

7. Determine the shearing stresses of I & T sections of beams and draw the diagrams.

8. Determine the section of homogeneous beam with respect to shearing stress and bending stress.

9. Determine the deflection of cantilever and simply supported beam with respect to concentrated/distributed load.

10. Draw the neat sketches of different type of riveted joints showing the mode of failures.

11. Determine the forces developed on the member of a truss graphically.

12. Prepare some models of different types of truss with suitable materials.

13. Draw a sketch of a pre-fabricated building and show the different elements in the figure.

REFERENCE BOOKS

1. Theory of simple structure   – T C Shed and J Vawter
2. Strength of materials and structures   – J Case and A H Chilver
3. Theory of structures   – R S Khurmi
4. Strength of Materials   – R S Khurmi
5. Steel Structure   - Gay Lord

66456   Hydraulics   **T P C**
                                     2 3 3

AIMS
  • To enable to understand the behavior of incompressible fluids.
  • To enable to understand the fundamentals of buoyancy.
  • To enable to understand flow of liquid in closed system and in open channel.
  • To assist in identifying the common measuring instruments / apparatus used in measuring the various
    parameters of flowing liquid.
  • To enable to applying the common measuring instruments / apparatus in measuring the various
    parameters of flowing liquid.

SHORT DESCRIPTION

Fluid pressure; Buoyancy; Principles of flow of fluid; Flow through orifices and mouthpieces; Losses of head
of flowing liquid; Friction and flow through pipes; Flow of liquid through notches and weirs; Flow of liquid
through open channel; Measurement of velocity of flow by current-meter and float.

DETAIL DESCRIPTION

1. **Understand the basic concept of fluid and its properties.**
    1.1 Define fluid, liquid, gases, fluid mechanics and hydraulics.
    1.2 Differentiate fluid, liquid and gases.
    1.3 Define density of fluid and specific weight.
    1.4 Mention the application of hydraulics.

2. **Understand the aspects of fluid pressure.**
    2.1 State the meaning of intensity of pressure.
    2.2 State the meaning of pressure head and static head of liquid.
    2.3 Define free surface of liquid, atmospheric pressure, gauge pressure, vacuum pressure and absolute
        pressure.
    2.4 Compute the intensity of pressure and total pressure at the base / side wall of a tank full of water.
    2.5 Identify hydraulic ram and plunger.
    2.6 Explain the working principle of a hydraulic ram.
    2.7 Calculate the weight lifting capacity of ram.

3. **Understand the technique of measuring the fluid pressure.**
    3.1 Define piezometer, manometer, differential manometer and inverted differential manometer.
    3.2 Outline the specific uses and limitations of each of the fluid pressure measuring devices in 3.1.
    3.3 Compute liquid pressure using piezometer.
    3.4 Compute liquid pressure using simple manometer.
    3.5 Compute difference of fluid pressure between two sections of a pipe line using differential
        manometer.
    3.6 Compute difference of fluid pressure between two sections of a pipe line using inverted differential
        manometer.

4. **Understand the concept of total pressure and center of pressure on immerged plane surface.**
    4.1 Explain total pressure and center of pressure on an immerged plane surface.
    4.2 Explain total pressure and center of pressure on an immerged inclined plane surface.

4.3 Express the deduction of formula for computing total pressure and center of pressure on a vertically immerged plane surface.

4.4 Express the deduction of formula for computing center of pressure on an inclined immerged surface.

4.5 Compute total pressure and center of pressure on a vertically immerged plane surface.

4.6 Compute total pressure and center of pressure on an inclined immerged surface.

5. Understand the fundamental concepts of buoyancy.

5.1 Define buoyancy and center of buoyancy.

5.2 State metacentre and metacentric height.

5.3 Mention the conditions of equilibrium of a floating body.

5.4 Compute the metacentric height using experimental formula.

6. Understand the principles of flow of liquid under different conditions.

6.1 Define various types of flow such as: laminar flow, turbulent flow, steady flow, unsteady flow, uniform flow, non-uniform flow, incompressible flow, rotational flow, irrotational flow, continuous flow.

6.2 Explain the term discharge.

6.3 State the equation of continuity of liquid flow.

6.4 Explain datum head, velocity head, pressure head and total head of a liquid.

7. Understand the concept of Bernoulli's theorem.

7.1 State the Bernoulli's theorem.

7.2 Prove the Bernoulli's theorem.

7.3 Describe construction of venturimeter and pitot tube.

7.4 Compute the discharge in a given pipe line by using venturimeter.

7.5 Compute velocity and discharge in a section of a flowing liquid by using a pitot tube.

8. Understand the aspects of flow through orifice and mouthpiece.

8.1 Define the terms: orifice, jet of water and venacontracta.

8.2 State the meaning of coefficient of contraction (Cc), coefficient of velocity (Cv), coefficient of discharge (Cd).

8.3 State the relation between Cc, Cv and Cd.

8.4 Calculate the time of emptying a rectangular tank and hemispherical vessel through orifice.

8.5 Define the term mouthpiece.

8.6 Explain the functions of a mouthpiece.

8.7 Distinguish between external and internal mouthpieces.

9. Understand the aspects of different types of losses of head of flowing liquid.

9.1 Define loss of head of flowing fluid.

9.2 Explain different types of losses of head of flowing liquid such as:
   a) Loss of head due to friction.
   b) Loss of head due to bend and elbows.
   c) Loss of head due to sudden enlargement.
   d) Loss of head due to sudden contraction.
   e) Loss of head at entrance to pipe.
   f) Loss of head due to obstruction.

9.3 Calculate loss of head due to friction.

10. Understand the aspects of friction and flow through pipes.

10.1 Describe friction of fluid flowing through pipes.

10.2 State the Chezy's formula for loss of head due to friction in pipes.

10.3 State the Darcy's formula for loss of head due to friction in pipes.

10.4 Calculate the loss of head due to friction in pipes using Chezy's formula.

10.5 Calculate the loss of head due to friction in pipes using Dracy's formula.

11. Understand the principle of flow through notches.

11.1 Describe notch.

11.2 Identify different types of notches.

11.3 Outline the advantages of triangular notch over rectangular notch.

11.4 State the formulae for measuring discharges through rectangular notch, V-notch and trapezoidal notch.

11.5 Calculate the discharges through rectangular notch using discharge formulae.

11.6 Calculate the discharges through triangular notch using discharge formulae.

11.7 Calculate the discharges through trapezoidal notch using discharge formulae.

12. Understand the principle of flow through weirs.

12.1 Describe weir.

12.2 Outline the differences between weir and notche.

12.3 State Francis' formula for discharge through a rectangular weir.

12.4 State Bazin's formula for discharge through a rectangular weir.

12.5 Calculate the discharges through rectangular weir using Francis' formula.

12.6 Calculate the discharges through rectangular weir using Bazin's formula.

13. Understand the aspects of flow of liquid through open channel.

13.1 Describe open channel, wetted perimeter, hydraulic radius, Laminar and turbulent flow, Reynold's number, hydraulic jump, critical depth, Critical velocity and hydraulic gradient.

13.2 State the different types of open channels.

13.3 State the Chezy's formula for velocity of flow in open channel.

13.4 State the Manning's formula for velocity of flow in open channel.

13.5 Select the conditions for most economical section of a rectangular channel.

13.6 Mention the uses of current meter and float to determine velocity of flow.

13.7 Measurement of velocity of flow by current meter and float.

PRACTICAL:

1. Measure pressure at a particular section / point of a tank or pipe line:
    a) by a piezometer.
    b) by a simple manometer.
2. Measure difference of pressure between two sections of a flowing liquid:
    a) by differential manometer.
    b) by inverted differential manometer.
3. Demonstrate proof of Bernoulli's theorem.
4. Measure discharge through a pipe line by venturimeter.
5. Determine coefficient of discharge (Cd), coefficient of velocity (Cv) and coefficient of contraction (Cc).
6. Measure discharge through a triangular notch (V-notch) and determine the coefficient of discharge.
7. Determine the co-efficient of friction in GI and PVC pipe.
8. Measure the loss of head due to friction in pipe.

9. Measure the loss of head due to sudden enlargement and sudden contraction of pipe.

10. Observe different types of flow in a typical open channel.

11. Measure velocity of flow in a typical open channel by :

    a) a current meter.

    b) a float.

    c) a pitot tube.

12. Observe hydraulic jump in a typical open channel due to obstruction of flow by a weir and measure the depth of the jump.

REFERENCE BOOKS

1. Hydraulics – E. H. Lewitt
2. A text book of Hydraulics – R. S. Khurmi
3. Hydraulics – H. W. King

65851   Accounting Theory & Practice   T   P   C

                                                       2   3   3

AIMS
- To be able to understand the principles and practices of book keeping and accounting.
- To be able to understand the procedures of general accounting, financial accounting and their applications.
- To be able to understand the concept of income tax , VAT & Public works accounts.

Course Outlines
Concept of book keeping and accounting; Transactions; Entry systems; Accounts; Journal; Ledger; Cash book; Trial balance; Final accounts; Cost account & financial accounting; Income Tax; Public works accounts.

DESCRIPTION;
Theory

1. Concept of book keeping and accounting.
   1.1 Define book keeping and accountancy.
   1.2 State the objectives & of book keeping.
   1.3 State the advantages of book keeping.
   1.4 Differentiate between book keeping and accounting.
   1.5 State the necessity and scope of book keeping and accounting.

2. Transactions Analysis.
   2.1 Define transactions and business transaction.
   2.2 Describe the characteristics of transaction.
   2.3 Discuss the classification of transaction.

3. Entry system of Accounting.
   3.1 State the aspects of transactions.
   3.2 Define single & double entry system ..
   3.3 Discuss the principles of double entry system.
   3.4 Distinguish between single entry and double entry system of book keeping.
   3.5 Justify whether double entry system is an improvement over the single entry system.

4. Classification of accounts.
   4.1 Define accounts.
   4.2 State the objectives of accounts.
   4.3 Illustrate different type of accounts with example.
   4.4 Define "Golden rules of Book keeping".
   4.5 State the rules for "Debit" and "Credit" in each class of accounts.
   4.6 Define accounting cycle.

5. Journal .
   5.1 Define Journal.
   5.2 State the functions of Journal.
   5.3 Mention the various names of Journal.
   5.4 Interpret the form of Journal.

6. **ledger.**

  6.1 Define ledger.

  6.2 Interpret the form of ledger.

  6.3 State the functions of ledger.

  6.4 Distinguish between Journal and Ledger.

  6.5 Explain why ledger is called the king of all books of accounts.

  6.6 Explain the following terms: Balance, Balancing; Debit balance; credit balance.

7. **Cash book & Its Classification.**

  7.1 Define cash book.

  7.2 Classification of cash book.

  7.3 Explain cash book as both Journal and Ledger.

  7.4 Define discount.

  7.5 Explain the different types of discount.

8. **Trial balance.**

  8.1 Define trial balance.

  8.2 State the object of a trial balance.

  8.3 Discuss the methods of preparation of a trial balance.

  8.4 Explain the limitations of a trial balance.

  8.5 Prepare trial balance from given ledger balance. (practical)

9. **Final accounts.**

  9.1 State the components of final account.

  9.2 Distinguish between trial balance and balance sheet.

  9.3 Select the items to be posted in the trading account, profit & loss account and the balance sheet.

  9.4 State the adjustment to be made from the given information below or above the trial balance.

  9.5 Explain the following terms: revenue expenditure; capital   expenditure; depreciation; annuity method demnishing balance method, machine hour method

10. **Cost and financial accounting.**

  10.1 Define financial accounting.

  10.2 State the objectives of financial accounting.

  10.3 Define cost accounting.

  10.4 State the elements of direct cost and indirect cost.

  10.5 Discuss the capital budgeting

  10.6 Explain the following terms:

  a. Fixed cost b. Variable cost c. Factory cost d. Overhead cost e. Process cost f. Direct cost g. Operating cost h. Standard cost

11. **Income Tax**

  11.1 Define Income Tax.

  11.2 State the objects of Income Tax.

  11.3 Classification of assesses.

  11.4.Taxable income of assesses.

  11.5 Tax rebate.

  11.6 Explain the following terms: Income tax year; assessment year,NBR.

12. **Public works accounts.**

  12.1 State the important aspects of public works accounts.

12.2 Describe the main features of public works accounts.

12.3 Define Value Added Tex (VAT)

12.4 State the merits and demerits of VAT.

12.5 Explain the following terms :Revenue ; Grant ; Bill; Voucher.

PRACTICAL

1. Identify the transaction from given statements stating reasons.
2. Determine Debtor (Dr) and Creditor (Cr.) from given transactions applying golden rules.
3. Journalize from given transactions.
4. Prepare ledger from given transactions.
5. Prepare double column cash book from given transactions showing balances.
6. Prepare triple column cash book from given transaction and find out the balances.
7. Prepare analytical and imprest system of cash book.
8. Prepare trial balance from the given ledger balance.
9. Prepare trading account, profit & loss account and balance sheet from the given trial balance & other information.
10. Prepare cost sheet showing prime cost, factory cost, cost of production, total cost and selling price.

REFERENCE BOOKS

1. Book-keeping & Accounting   -   Prof. Gazi Abdus Salam
2. Principles of Accounting   -   Hafiz uddin
3. Cost Accounting   - Prof. Asimuddin Mondol
৪. হিসাবরক্ষণ ও হিসাববিজ্ঞান   - পরেশ মণ্ডল
৫. উচ্চ মাধ্যমিক হিসাববিজ্ঞান   - হক ও হোসাইন
৬. আয়কর   - ড. মনজুর মোরশেদ