BANGLADESH TECHNICAL EDUCATION BOARD

Agargaon, Dhaka-1207

4-YEAR DIPLOMA-IN-ENGINEERING PROGRAM

SYLLABUS (PROBIDHAN-2016)

SURVEYING TECHNOLOGY

TECHNOLOGY CODE: **678**

5th SEMESTER

DIPLOMA IN ENGINEERING

PROBIDHAN-2016

SURVEYING TECHNOLOGY (678)

FIFTH SEMESTER

Sl. No	Subject code	Name of the subject	T	P	C	MARKS				
						Theory		Practical		Total
						Cont. assess	Final exam.	Cont. assess	Final exam.	
1	67851	Geodetic Surveying	2	3	3	40	60	25	25	150
2	67852	Hydraulics & Hydrology	2	3	3	40	60	25	25	150
3	67853	GIS & Digital Cartography	2	3	3	40	60	25	25	150
4	66454	Theory of Structure	2	3	3	40	60	25	25	150
5	66455	Estimating & Costing-II	2	3	3	40	60	25	25	150
6	69054	Environmental Studies	2	-	2	40	60	-	-	100
7	65851	Accounting Theory & Practice	2	3	3	40	60	50	-	150
	Total		**14**	**18**	**20**	**280**	**420**	**175**	**125**	**1000**

67851 Geodetic Surveying

T	P	C
2	3	3

AIMS

- To be able to understand the geodetic survey and its essential features.
- To be able to understand the triangulation system and its adjustments.
- To be able to understand procedure of triangulation used in geodetic surveying.
- To be able to understand the field astronomy and its uses in geodetic surveying.

SHORT DESCRIPTION

Geodetic surveying, Concept of triangulation, Measurement of horizontal angle, Measurement of base line, Computation of geodetic position, Field astronomy and related terms, Time, Correction to the observed altitude, Azimuth of a celestial body, Local time, Latitude of a place, Longitude of a place.

DETAILED DESCRIPTION

Theory:

1. Understand geodetic surveying.

1.1 Explain geodetic surveying and geo-physics.
1.2 Describe the objectives of geodetic surveying.
1.3 Differentiate geodetic surveying with plane surveying.
1.4 Describe the principle of triangulation.
1.5 List the steps in triangulation.
1.6 Classify triangulation system.
1.7 Describe the characteristics of triangulation system according to classification.

2. Understand the concept of triangulation.

2.1 Explain reconnaissance survey.
2.2 Describe the points to be considered in selecting the station points.
2.3 Describe the objectives of triangulation.
2.4 Explain tower and signals.
2.5 Discuss the procedure of base line measurement.
2.6 Describe reduction to center.
2.7 Solve problems.

3. Understand the measurement of horizontal angle in geodetic surveying.

3.1 Explain the procedure of measuring horizontal angle
3.2 Explain atmospheric conditions suitable for measuring horizontal angles.
3.3 Explain the differences between the geodetic survey instrument and plane survey instrument.
3.4 Explain the types and quality of instrument used in measuring horizontal angles in different triangulation system.
3.5 Explain the measurement of horizontal angle by the method of reiteration.
3.6 Explain the measurement of vertical angle by the method of reiteration.
3.7 Explain eccentricity of signal.

4. Understand the measurement of base line.

4.1 Explain the importance of base line in triangulation survey.
4.2 Discuss the requirement to be taken into consideration in selecting the site of base line.

4.3 Explain base net.
4.4 Explain the equipment used for base line measurement.
4.5 Discuss the measurement technique of base line.
4.6 Explain necessary corrections for base line measurement.
4.7 Explain the technique in extension of base line.
4.8 Solve problems in determining correct length of base line.

5. Understand the Triangulation Adjustment

5.1 Define Laws of Weight, Most Probable Value of Quantity, Probable Error
5.2 Describe Station Adjustment
5.3 Describe Triangle Adjustment
5.4 Describe Spherical Excess
5.5 Compute the Lengths of the sides of a Spherical Triangle
5.6 Describe the adjustment of a Chain of Triangle
5.7 Describe the adjustment of two Connected Triangles
5.8 Describe the adjustment of a Geodetic Quadrilateral

6. Understand computation of geodetic position.

6.1 Explain azimuth of survey line
6.2 Compare azimuth with bearing of survey line.
6.3 Express the deduction of the formula for determining convergence of meridian.
6.4 Explain the method of computation of geodetic position.
6.5 Solve problems in computing geodetic position.

7. Understand the co-ordinate system of heavenly bodies.

7.1 Explain the altitude and azimuth system.
7.2 Explain the declination and hour angle system.
7.3 Explain the declination and right ascension system.
7.4 Compare the co-ordinate system of heavenly bodies.
7.5 Explain astronomical triangle.
7.6 Solve problems relating to astronomical triangle
(i) to determine the azimuth & altitude of the star.
(ii) to determine the hour angle and declination of a star.
(iii) to calculate Sun's azimuth and hour angle.

8. Understand the Time.

8.1 Explain the term: Sideral Time, apparent Solar Time, Mean Solar Time, Local Time, Local Mean Time, Greenwich Mean Time, Standard Time.
8.2 Explain the equation of time.
8.3 Convert standard time to local mean time and vice versa.
8.4 Convert local time to Greenwich Time and vice versa.
8.5 Explain the necessity of determining local time in astronomical survey.
8.6 Explain the determination of local time by extra meridian observation of a star.
8.7 Explain the determination of local time by extra meridian observation of the sun.
8.8 Explain the determination of local time by meridian transit of a star.
8.9 Explain the determination of local time by meridian transit of the sun.

9. Understand necessary correction to the observed altitude of a celestial body.

9.1 List different types of necessary corrections.
9.2 Explain correction for index error.

9.3 Explain correction for bubble error.
9.4 Explain correction for Curvature.
9.5 Explain correction for refraction.
9.6 Explain correction for parallax.
9.7 Explain correction for semi diameter.
9.8 Explain correction for dip.
9.9 Solve problems in determine correct attitude of a celestial body.

10. Understand the method of determining azimuth of a celestial body or survey line.

10.1 Explain reference mark.
10.2 Describe the method of fixation of reference mark.
10.3 Describe the method of determining the approximate position of a Star or Sun.
10.4 Explain the method of locating Polaris.
10.5 Define true Meridian.
10.6 Describe the method of determining true meridian by taking observation on Polaris at culmination and Polaris at elongation.
10.7 Describe the method of determining the azimuth of a line by extra meridian observation of the sun.

11. Understand the method of determining latitude of a place.

11.1 Define latitude of a place.
11.2 Explain determination of latitudes of a place by the altitude of air compiler star at upper and lower transits.
11.3 Explain the determination of latitude of a place by the meridian and altitude of a star or sun.
11.4 Explain the determination of latitude by extra meridian observation of Polaris.
11.5 Solve problems in determining latitude of a place.

12. Understand the method of determining longitude of a place.

12.1 Define longitude of a place.
12.2 List the chief methods of determining longitude of a place.
12.3 Explain the determination longitude of a place by wireless time signal.
12.4 Describe solar attachment.
12.5 Describe the method of determining meridian and local time by solar attachment.

PRACTICAL:

1. Conduct triangulation survey network within the institute.
2. Select station and form triangulation.
3. Select base line.
4. Measure the base line.
5. Measure the horizontal angles of the triangulation network.
6. Apply the procedure of triangulation adjustment.
7. Determine the geodetic position of individual station of the triangulation network.
8. Prepare a triangulation map.
9. Determine latitude of a place (Own Institution) by observing Polaris.
10. Determine longitude of a place (Own Institution).
11. Determine the sun's declination at any instant of local time.
12. Determine the corrections necessary to the observed altitude of sun or star.

REFERENCE BOOKS:

1. Surveying & Leveling Vol-1 & 2 - by T.P. Kanethker
2. Surveying 1, 2, & 3 - by Dr. B.C Punmia
3. Surveying Vol- 1 & 2 - by Dr. K.R. Arora

67852 Hydraulics & Hydrology

T	P	C
2	3	3

AIMS

- To be able to understand the behavior of incompressible liquid.
- To be able to understand buoyancy.
- To be able to understand flow of liquid.
- To be able to identify common measuring instruments / apparatus used in measuring the various parameters of flowing liquid and appreciate their uses in measuring the parameters of flow.
- To be able to understand the influence of the climatic condition of Bangladesh on its ground water and surface water flow.
- To be able to understand the basic principle of geomorphology as it applied to Bangladesh.
- To be able to compare various means of lifting underground water and to be able to select appropriate means for given situation.
- To be able to understand recharging of underground water and ascertain its necessity in Bangladesh.

SHORT DESCRIPTION

Fluid and its properties; Fluid pressure and its behavior; Measuring the fluid pressure; Total pressure and center of pressure on immersed plane surface; Buoyancy; Principles of flow of a fluid under different condition; Flow through orifices; Flow through mouthpieces; Flow of liquid through open channel; Sources of water; Rainfall and run-off; Geomorphology; Lifting of underground water; Pumps and pumping of water; Recharging of ground water.

DETAIL DESCRIPTION

THEORY:

1. Understand fluid and its properties.

1.1 Define hydraulics.
1.2 Describe fluid, liquid and gases.
1.3 Distinguish between liquid and gas.
1.4 Explain density, specific weight, surface tension, capillarity and viscosity of fluid water and intensity of pressure.
1.5 Explain Pascal's law.
1.6 Explain free surface of liquid, atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure.
1.7 Explain pressure head / static head.
1.8 Explain the working principle of a hydraulic ram.
1.9 Solved problem.

2. Understand the principle of measuring the fluid pressure.

2.1 Identify the various types of measuring devices used for measuring fluid pressure.
2.2 Describe the various devices for measuring fluid pressure.
2.3 Out line the uses and limitations of each of the fluid pressure measuring devices.
2.4 Mention the sequences of pressure measurement technique for each of the device used in hydraulics.

2.5 Compute the fluid pressure using piezometer.
2.6 Compute the fluid pressure using simple manometer.
2.7 Compute the difference of fluid pressure between two sections of a pipe line by a given differential manometer.
2.8 Compute difference of fluid pressure between two sections of a pipe line using inverted differential manometer.

3. Understand total pressure and center of pressure on immersed plane surface.

3.1 Explain the meaning of the total pressure and center of pressure on an immersed plane surface.
3.2 Describe an expression for solving total pressure on horizontal immersed plane surface.
3.3 Compute total pressure on a horizontally immersed plane surface.
3.4 Express the deduction of a formula for solving total pressure on horizontally immersed plane surface.
3.5 Express the deduction of a formula for computing center of pressure on a vertically immersed plane surface.
3.6 Compute total pressure and locate center of pressure on a vertically immersed plane surface.
3.7 Express the deduction of a formula for computing total pressure on an inclined immersed plane surface.
3.8 Express the deduction of a formula for computing center of pressure on an inclined immersed plane surface.
3.9 Compute total pressure and center of pressure on an inclined immersed plane surface.

4. Understand the Buoyancy.

4.1 State Archimedes principle for floating bodies.
4.2 Define buoyancy and centre of buoyancy.
4.3 Explain the meaning of metacenter and metacentric height.
4.4 Explain the conditions of equilibrium of a floating body.
4.5 Determine metacentric height experimentally.
4.6 Compute metacentric height using experimental formula.

5. Understand the principles of fluid under different conditions.

5.1 Define various types of flow such as laminar and turbulent flow, steady flow, un-steady flow, uniform flow, non-uniform flow, incompressible flow, rotational flow, Irrotational flow and continuous flow.
5.2 Explain discharge.
5.3 Explain head and total head of a liquid.
5.4 State Bernoulli's theorem.
5.5 Interpret Bernoulli's theorem in solving problems.
5.6 Describe Venturimeter.
5.7 Compute discharge in a given pipe line by using Venturimeter.
5.8 Describe a Pitot tube.
5.9 Compute velocity and discharge in a section of a flowing liquid by Pitot tube.

6. Understand the concept of flow through orifices.

6.1 Define orifice, jet of water & vena contracta.
6.2 Explain the meaning of coefficient of contraction (Cc), coefficient of velocity (Cv), Co-efficient of discharge (Cd) and Co-efficient of resistance (Cr).
6.3 Express the deduction of the relation between Cc, Cv and Cd.

6.4 Determine hydraulic co-efficient, co-efficient of contractions, co-efficient of velocity and co-efficient of discharge for flow through an orifice.

7. Understand the flow through mouth pieces.

7.1 Define a mouth piece.

7.2 Explain the functions of a mouth piece.

7.3 Describe external and internal mouth piece.

7.4 Calculate the flow through a mouth piece.

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

8.1 Explain the meaning of fluid friction

8.2 Define 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.

8.3 Write down the formulae for different types of losses of head.

8.4 Calculate loss of head due to friction.

9. Understand the concept of flow of liquid through open channel

9.1 Define open channel, wetted perimeter and hydraulic radius

9.2 Describe different types of open channel

9.3 Mention Chezy's formula and Manning's formula for velocity of flow in open channel.

9.4 State the condition for most economical section of a rectangular channel and a trapezoidal channel

9.5 Solve problems in respect of most economical section of rectangular and trapezoidal channel for maximum discharge

9.6 Explain the meaning of the different types of flow in open channel, critical depth of flowing liquid specific energy, hydraulic jump.

10. Understand different sources of water.

10.1 Explain the hydrological cycle with neat sketch

10.2 Explain the meaning of the following:

- Rainfall
- Rainfall intensity and duration frequency relationship
- Run-off
- Infiltration
- Evaporation
- Transpiration
- Evapo-transpiration
- Permeable and impermeable strata of soil
- Ground water table
- Aquifer
- Precipitation

10.3 Classify the sources of water (surface water and ground water).

11. Understand the characteristics of rainfall and run-off in Bangladesh.

11.1 Explain the characteristics of rainfall and run-off in Bangladesh.
11.2 Describe different types of rain gauge used in Bangladesh with sketch.
11.3 Describe the factors affecting the run-off of an area.
11.4 Determine average annual run-off of a catchment area from given data.
11.5 Explain the components of storm hydrograph.
11.6 Explain the meaning and construction of an unit hydrograph with sketch.
11.7 Explain the meaning of geomorphology.
11.8 Describe the principle of geomorphology as it applies to Bangladesh

12. Understand the mechanism of lifting underground water.

12.1 Explain with sketch the meaning of:
- shallow well
- deep well
- artesian well
- spring well

12.2 Describe well screen.
12.3 Explain the gravel packed well with sketch.
12.4 Describe different boring systems of tube well.
12.5 Point out different in tube well boring and their remedies.
12.6 Explain with neat sketch the cone of depression.
12.7 Explain and tests for yield of a tube well.
12.8 Mention the equilibrium equation for flow of water into well.
12.9 Explain critical velocity and critical head.

13. Understand pump and pumping of water.

13.1 State classification of pump.
13.2 Describe the components of a reciprocating pump (hand pump).
13.3 Determine the discharge capacity of a reciprocating pump.
13.4 Explain tara pump and its working principle.
13.5 Explain the components of a tara pump.
13.6 List advantages of tara pump over common hand pump.
13.7 Describe the centrifugal pump and turbine pump.
13.8 Explain the suction and discharge capacity of a centrifugal pump.
13.9 Determine work, power and efficiency of pump under given condition.

PRACTICAL:

1. Measure the pressure at a particular section / point of a tank or pipe line:
   - by a Piezometer
   - by a simple Manometer.
2. Measure the difference of pressure between two sections of a flowing liquid:
   - by differential manometer
   - by inverted differential manometer
3. Observe different types of flow in a typical open channel.
4. Measure the velocity of flow in a typical open channel by a Pitot tube.
5. Measure the rainfall by rain gauge and determine the intensity of rainfall.
6. Construct a unit hydrograph with sketch.

7. Observe the process of tube well boring system and write a report in sequence.
8. Disassemble and assemble common hand pump. tara pump and centrifugal pump.
9. Perform test for yield of a tube well.

REFERENCE BOOKS:

1. Hydraulics - by E. H. Lewitt
2. A Text Book of Hydraulics - by R. S. Khurmi
3. Hydraulics - by H. K. King
4. Hydrology - by Raghunath
5. Irrigation Engineering and Hydraulic Structure - by Santosh Kumar Garg
6. Introductory Irrigation - by B. C. Punmia

67853 GIS & Digital Cartography

T	P	C
2	3	3

AIMS

- To be able to develop knowledge of Geographic Information System (GIS)
- To be able to attain knowledge about Spatial Database and GIS software
- To be able to develop knowledge, skill and attitude of digital cartography and cartographic instrument.
- To be able to develop knowledge, skill and attitude of drawing Mouza map.
- To be able to understand the map projection and map reproduction.
- To be able to acquire knowledge & skill of preserving and maintaining map sheets.
- To be able to understand the numbering system of topographic map of Bangladesh and adjacent countries.

SHORT DESCRIPTION

Concept of Geographic Information System (GIS), Use of GIS, Spatial Database, GIS software, Digital Cartography, Cartographic techniques, Mouza map, Topographical map, Topographic instruments, Map projection, Preserving & maintenance of map sheets, Compilation of map from various sources, numbering system of topographic map, Compilation of map from aerial photograph, Map reproduction.

[A visit for 2 weeks *to Survey of Bangladesh(SoB)* and *DLRS*]

DETAIL DESCRIPTION

Theory:

1. Understand the principle of Geographic Information System (GIS)

1.1 Define Geographic Information Systems (GIS).
1.2 Describe development history of GIS.
1.3 Describe advantages of GIS.
1.4 Mention Basic functions of GIS.
1.5 Define GIS data
1.6 Describe GIS data model.
1.7 Describe different Source of geographic data.
1.8 Describe different methods of data capture.
1.9 Describe different organizations using GIS

2. Understand Spatial Database and Computer System for GIS

2.1 Define Spatial Database.
2.2 Mention required function for Spatial Database.
2.3 Describe Distribution of Spatial Database.
2.4 Describe database management system.
2.5 List required hardware and software for GIS.
2.6 Describe Arc GIS platforms, Arc Map, Arc Catalogue, Arc Toolbox .
2.7 Prepare Spatial Database using GIS software.
2.8 Prepare a GIS Map using GIS software.

3. Understand the concept of digital cartography.

3.1 Define digital cartography and reprography.

3.2 Describe the history of digital cartography.
3.3 Explain the necessity of digital cartography in surveying.
3.4 Describe the advantages of digital cartography
3.5 Describe difference between traditional and digital cartography
3.6 Differentiate digital cartography with GIS
3.7 Define Computer Aided Cartography (CAC)
3.8 Describe the advantages of CAC

4. Understand the concept of Map.

4.1 Define Digital Map and Mobile Mapping.
4.2 Explain the Classification of Map/Digital Map
4.3 List the elements of Map.
4.4 Define the terms: Cadastral map, Topographical map, Geographical map, Town map, Administrative map.
4.5 Mention the uses of Digital Map
4.6 Define Computer Aided Mapping (CAM)
4.7 Describe the advantages of CAM
4.8 List different types of mapping software.

5. Understand fair drawing / final drawing of Mouza Map

5.1 Explain the preparatory work for making a Mouza Map.
5.2 Mention the method of color combination in digital Mouza map
5.3 Explain the method of writing the name of adjacent thana mouza.
5.4 Explain the scale of the map.
5.5 List the symbols used in Mouza Map.

6. Understand the fair drawing of Digital Topographical Map

6.1 List the equipment for digital topographical map.
6.2 Explain the steps of preparing digital topographical map.
6.3 Define the following terms: Outline, Contour, Tree, Name origin.
6.4 Define color patterns and origin.
6.5 Explain the procedure of preparing color patterns and origin.
6.6 Compare the traditional topographical map with digital topographical map.

7. Understand the cartographic instruments

7.1 State the use of Scanner, Printer, Plotter and Photocopier
7.2 Describe different types of printer
7.3 Describe DPI and PPI in printer and scanner
7.4 State the use of Digital Planimeter
7.5 State the use of digital map measure
7.6 State the use of Ammonia printing machine

8. Understand the Map Projection

8.1 Define map projection
8.2 Explain the objective of map projection
8.3 Distinguish between the spheroid and map projection
8.4 Mention the classification of map projection
8.5 Define Orthomorphic projection, Equal area projection, Cassini Projection, Transverse Mercator and Lambert Projection.

9. Understand the technique of preserving and maintenance of map sheets

9.1 State the procedure of making history sheet.
9.2 Explain the purpose of history sheet.
9.3 Describe the procedure of maintaining the office copies.
9.4 Explain the method of examination and submission of sheet.
9.5 Describe the process of correction of drawing.
9.6 Explain the preparation of color guide.
9.7 Explain the meaning of proof examination.
9.8 Describe preserving map sheets by converting it into soft copies

10. Understand the compilation of map from various sources

10.1 Define Mosaic of map
10.2 State the meaning of compilation of map.
10.3 Explain the purpose of compilation of map.
10.4 Describe the procedure of making upazila map from mouza map.
10.5 Describe the procedure of making district map from upazila map.
10.6 Describe the procedure of making country map from district map.

11. Understand the numbering systems of Topographic Map

11.1 Define numbering system.
11.2 Explain the purpose of numbering the topographic map.
11.3 Define map catalogue or map index.
11.4 Explain the purpose of map catalogue for topographical map and other large scale map.
11.5 Explain the procedure of numbering on sheet of topographical map of Bangladesh and adjacent countries.

12. Understand the compilation of map from Aerial Photograph

12.1 Interpret the Aerial Photograph.
12.2 Explain stereoscopic fusion.
12.3 State indexing of aerial photograph on maps.
12.4 Describe scale of aerial photograph.
12.5 Describe the procedure of selection of minor control point on aerial photograph.
12.6 Describe the procedure of transfer of minor control point on aerial photograph.
12.7 Identify man-made object
12.8 Identify photogrammetric instruments.
12.9 Define principal and common control point.
12.10 Use of laser scanner and High Resolution satellite.

13. Understand the Map Reproduction

13.1 Describe the process of map reproduction.
13.2 Explain the purpose of map reproduction.
13.3 Describe the procedure of Scanning a Map
13.4 Plot a Map with the help of a Plotter
13.5 Describe the procedure of printing a Map
13.6 Describe the procedure of Ammonia Printing & Blue Printing
13.7 Reproduce a Map with the help of Photocopier
13.8 Describe the procedure of enlarging map with the help of scanner, printer and Photocopier
13.9 Describe the procedure of reducing map with the help of scanner, printer and Photocopier
13.10 Use of Drone Survey for Aerial photogrammetry/topo-survey.

PRACTICAL:

1. Prepare Spatial Database using GIS software.
2. Draw international map of world in a sheet.
3. Draw conventional symbols for topographic map.
4. Draw a map of Bangladesh & its adjacent countries with Lamberts grid projection.
5. Prepare a guide map of your own town.
6. Prepare a map of scale 1″ = 1 mile from a map of scale 16″ = 1 mile using pantograph.
7. Prepare a map of scale 1:250000 from a map of scale 1:50000.
8. Draw a topographical map with the help of CAD Software.
9. Draw a Mouza map with the help of CAD Software.
10. Prepare district map from Mouza map.

REFERENCE BOOKS:

1. GIS Work Book —Murai Sanji.
2. Cartography 1 and 2—M.A Malek
3. Applied Geography—Kazi Abdur Rouf

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

66455 Estimating & Costing-2

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AIMS

- To be able to understand the estimating of framed structure multi-storied building.
- To be able to understand the estimating of roof truss, bridge & culvert and deep tube well.
- To able in preparation of the specification and tender documents of civil engineering works.
- To able to understand the public works account and forms.
- To be able to improve knowledge and skill of rate analysis process for different Items of work in building construction as per PWD standard.
- To be able to understand the valuation property and building.

SHORT DESCRIPTION

Estimate of multi-storied framed structure building i/c Sanitary works; Culvert & Bridge; Reinforced cement concrete retaining wall; Roof truss; Steel Structure; Deep tube well; Preliminary estimate for building project work according to plinth area rate; Rate analysis and valuation of property. Bar schedule of beam, column, one way & two way slab.

DETAIL DESCRIPTION

Theory:

1. Understand the components and item of works of Multi- storied framed structure building.

1.1 Define framed structure building.
1.2 Define substructure and superstructure of a building.
1.3 Differentiate between structural and non-structural member in a framed structure building.

2. Understand the earth work, brick flat soling and cement concrete in foundation and plinth.

2.1 State the way of calculating earth work in excavation for foundation trenches.
2.2 State the way of calculating earth work in filling of foundation trenches.
2.3 State the way of calculating earth work in filling plinth for rooms and verandah.
2.4 State the way of calculating brick flat soling in foundation and floors.
2.5 State the way of calculating mass concrete work in foundation and floors.

3. Understand the reinforced cement concrete work in different items of building

3.1 State the method of calculating R.C.C work in different types of column with footing. (i.e. square, L-shaped, T- shaped, I-shaped and circular section column with block and sloped spread footings and quantity of reinforcement I/c bar schedule and formworks.
3.2 State the method of calculating quantity of R.C.C work and reinforcement (i/c bar schedule), formworks for R.C.C work in all types of beam, lintel, one way and two way slab, cantilever and porch slab.
3.3 State the method of calculating R.C.C work in sun shed, shelves, railing, drop wall, etc.
3.4 State the method of calculating R.C.C work in stair and quantity of reinforcement i/c bar schedule and formworks.

4. Understand the brick work and cement plaster work in foundation and superstructure.

4.1 Mention the unit of brick work (half having half brick thick wall) in partition walls.
4.2 State the method of calculating cement plaster work on inner side and outer side of brick wall.

4.3 State the method of calculating cement plaster work over reinforced cement concrete surfaces such as: column, lintel, beam, ceiling, sun shed, shelve, railing, drop wall, fins or louvers and stair etc.

5. Understand the wood work in different types of doors and windows with grill works.

5.1 Mention the unit of wood works in door and window shutters.
5.2 State the method of calculating wood work in door frames.
5.3 State the method of calculating wood work in door shutters.
5.4 State the method of calculating wood work in window frames.
5.5 State the method of calculating wood work in window shutters.
5.6 State the method of calculating the steel/aluminum frame and shutters of doors and windows i/c glass fiber shutter.
5.7 Mention the unit of grill works.
5.8 Calculate grill works in window and verandah.
5.9 Calculate the quantity of M.S, S.S, Aluminum bar etc. for grill/frame work as per detail drawing.

6. Understand the patent stone flooring, mosaic work, tiles & skirting.

6.1 State the method of calculating patent stone flooring.
6.2 State the method of calculating tiles work in floor and wall.
6.3 State the method of calculating mosaic work on floor.
6.4 State the method of calculating skirting work.
6.5 Calculate the quantity of floor tiles, wall tiles and mosaic work.

7. Understand the lime terracing work over RCC roof slab.

7.1 State the method of calculating lime terracing work.
7.2 List the materials required for lime terracing work.
7.3 Calculate the quantity of lime terracing work.

8. Understand the surface finishing works of building.

8.1 State the method of calculating white wash (inside only) and color wash (outside only).
8.2 State the method of calculating wall and ceiling paper.
8.3 State the method of calculating distemper (inside only).
8.4 State the method of calculating plastic emulsion paint (inside only).
8.5 State the method of calculating snowcem wash and weather coat (outside only).
8.6 State the method of calculating synthetic enamel paint to doors and windows.
8.7 State the method of calculating synthetic enamel paint to grills.
8.8 State the method of calculating synthetic enamel paint to skirting.
8.9 State the method of calculating varnishing / French polish to wooden doors and windows.

9. Understand the estimate of septic tank.

9.1 State the different items of work in septic tank and soak well.
9.2 State the way of calculating earth work in excavation for septic tank and soak well.
9.3 State the method of calculating brick work in septic tank and soak well.
9.4 State the method of calculating RCC and CC work in septic tank and soak well.
9.5 State the method of calculating cement plaster work in septic tank and soak well.
9.7 Calculate the different items of work in septic tank and soak well.

10. Understand the estimate of RCC retaining wall and RCC culvert.

10.1 State the way of calculating earth work in excavation for foundation trenches of RCC retaining wall.

10.2 State the method of calculating mass concrete and RCC work in RCC retaining wall.
10.3 State the method of calculating back filling work in RCC retaining wall.
10.4 State the method of calculating and make bar schedule of M.S bar.
10.5 State the way of calculating earth work in excavation for foundation trenches of culvert.
10.6 State the method of calculating brick work, mass concrete and RCC work in culvert.
10.7 State the method of calculating cement plaster work in culvert.
10.8 State the method of calculating earth filling work in culvert.

11. Understand the estimate of roof truss (wooden & steel).

11.1 State the different items of work of roof truss.
11.2 State the way of calculating the quantities of wood required in a roof truss.
11.3 State the way of calculating the quantities of steel required in a roof truss.
11.4 Mention the standard lapping at end & sides of CI sheet for roofing.
11.5 State the way of calculating the quantities of CI sheet for roof covering.
11.6 State the way of calculating the quantities of GI ridging.
11.7 State the way of calculating the painting works of roof truss.
11.8 Calculate the different items of work of wooden roof truss.
11.9 Calculate the different items of work of steel roof truss.

12. Understand the estimation of steel structure (vertical iron column).

12.1 Identify the different components and accessories of steel structure.
12.2 State the way of calculating the quantities of steel (iron) required in steel structure.
12.3 State the way of calculating the quantities of gusset plate, bolts and nuts used in steel structure.
12.4 State the way of calculating the painting work of steel structure.

13. Understand the estimation of plumbing and sanitary works.

13.1 State the method of estimate plumbing and sanitary works.
13.2 Name the different fittings and fixtures required for water supply and sanitary works
13.3 Describe the method of estimation the drainage works of a buildings.

14. Understanding the process of analysis of rates of various items of work as per PWD standard.

14.1 State the requirements of rate analysis.
14.2 Mention the important factors that affect the analysis of rates.
14.3 Describe the procedure of rate analysis to calculate the rate per unit of the item of works.
14.4 List the quantity of materials and the number of different categories of labour required for the following item of work and analysis the unit rate i/c contractors profit, tools and plants (T&P) over head expenses, income tax (IT) and value added tax (VAT) as per PWD standard.

a. Earth work in excavation for foundation trenches.
b. Earth and sand filling in foundation and plinth.
c. One layer brick flat soling in foundation and floor.
d. Cement concrete work (1:3:6) in foundation and floor.
e. Brick work in foundation up to plinth with 1:6 cement mortar.
f. 75 mm thick damp proof course (DPC) in proportion 1 :1.5: 3.
g. Brick work of 250 mm & above thick wall in superstructure with 1:6 cement mortar.
h. Brick work of 125mm thick wall in superstructure with 1:4 cement mortar.
I. RCC work in proportion 1:2:4 and 1:1.5:3 i/c shuttering cost (footing, grade beam, column below & above plinth, lintel & tie beam, roof beam, roof slab, Sun shade, railings, drop wall, shelves, parapet & stair slab etc.

j. Mild steel reinforcement fabrication work in different types of RCC work for one quintal of work.
k. Patent stone flooring in proportion 1:1.5:3 with neat cement finish.
l. Average 12 mm thick cement plaster (1:6) to brick walls.
m. Average 6 mm thick cement plaster (1:4) to RCC surface.
n. Lime terracing work with proportion of 2:2:7 over roof slab.
o. Teak wooden door frame and 38 mm thick paneled door shutter.
p. Aluminum swing and sliding door and window.
q. Steel glazed window shutter with Z- section, T- section, FI bars etc.
r. White washing, color washing, distempering, snowcem washing, plastic emulsion paint, synthetic enamel paint wherever necessary.
s. Installation of European type commode & Indian type long pan (WC) with low level flushing tank, bath tub, wash hand basin, sink, squatting & standing urinals.

15. Understand the preliminary estimate for building project work according to plinth area rate.

15.1 State the meaning of preliminary estimate.
15.2 Mention the basis of calculating preliminary cost estimate of a building project work.
15.3 Describe the calculation procedure of preliminary cost estimate for building project work according to plinth area rate.

16. Understand the public works account and forms.

16.1 Name different methods of carrying out works.
16.2 Explain imprested account.
16.3 Describe the master roll part-I and part-II.
16.4 Describe the measurement book (MB).
19.5 Define bill and voucher.
16.6 Define running & final bill.
16.7 Describe the mode of payment.
16.8 Mention the duties of Sub-Assistant Engineer.
16.9 Describe PPA - 2008.

17. Understand valuation of property and building.

17.1 State the meaning of valuation of property.
17.2 Mention the necessity of valuation.
17.3 Define the following terms:

a. Outgoings (Taxes, Repairs, Management and collection charges, sinking fund, loss and rent, Miscellaneous.)
b. Municipal taxes.
c. Scrap value.
d. Salvage value.
e. Market value.
f. Book value.
g. Rateable value.
h. Obsolescence.
i. Annuity.
j. Capital cost.
k. Capitalized value.
l. Years purchase (YP).
m. Sinking funds

17.4 Define the term valuation of building.
17.5 Describe the process to determine the cost of construction of a building.
17.6 Describe the process of valuation of a building.
17.7 Solve the problems related to a building from given data.

PRACTICAL:

1. Estimate the earth work in excavation and earth filling for foundation trenches.

1.1 Select a drawing of a two-storied framed structure building.
1.2 Determine the length, breadth & height of foundation trenches of columns and bottom of grade beam (if necessary) & verandah walls.
1.3 Calculate the quantity of earthwork in excavation in foundation trenches.
1.4 Determine the length, breadth & height of filling in plinth.
1.5 Calculate the quantity of earth work in filling plinth.
1.6 Calculate the quantity of earth work in filling the sides of column foundation trenches & sides of grade beam (if necessary).

2. Estimate the brick flat soling & mass concrete in foundation and floor.

2.1 Determine the length & breadth for brick flat soling in foundation and floor.
2.2 Calculate the total quantity of brick flat soling in foundation and floor.
2.3 Determine the length, breadth & thickness of mass concrete in foundation and floor.
2.4 Calculate the total quantity of mass concrete in foundation and floor.

3. Estimate the reinforced cement concrete work in foundation up to plinth level.

3.1 Determine the length, breadth & thickness of column footing.
3.2 Calculate the quantity of RCC work in column footing.
3.3 Determine the length, breadth & height of column up to plinth level.
3.4 Calculate the quantity of RCC work in column up to plinth level.
3.5 Determine the length, breadth & depth of grade beam.
3.6 Calculate the quantity of RCC work in grade beam.

4. Estimate the reinforced cement concrete work in superstructure.

4.1 Determine the length, breadth & height of column, lintel, beam, floor slab/roof sunshed, shelve, railing, drop wall, fins or louvers, stair slab, steps, beam, landing slab in each floor.
4.2 Calculate the quantity of RCC work in column in each floor.
4.3 Calculate the quantity of RCC work in lintel in each floor.
4.4 Calculate the quantity of RCC work in beam in each floor.
4.5 Calculate the quantity of RCC work in sunshed, shelve, railing, drop wall, fins or louvers in each floor.
4.6 Calculate the quantity of RCC work in stair slab, steps, beam, landing slab in each floor.
4.7 Calculate the quantity of reinforcement in different items building with bar schedule.

5. Estimate the brick work in sub-structure (foundation up to plinth level) and superstructure.

5.1 Determine the length, breadth & height of brick walls up to plinth level.
5.2 Calculate the quantity of brick work in sub-structure.
5.3 Determine the length & height of one brick thick walls in superstructure in each floor.
5.4 Calculate the quantity of brick work (one brick thick wall) in super structure in each floor (cum).
5.5 Determine the length & height of partition wall (half brick thick wall) in super structure in each floor.

5.6 Calculate the quantity of brick work (half brick thick wall) in super structure in each floor (sqm).

5.7 Calculate the quantity of curtain wall of a high rise building i/c all accessories with aluminum frame.

6. Estimate the cement plaster work on brick walls and RCC surfaces.

6.1 Determine the length & height of brick walls (inner side, outer side).

6.2 Calculate the quantity of cement plaster on brick walls (inner side, outer side).

6.3 Calculate the quantity of deduction for doors, windows and verandah opening.

6.4 Calculate the total quantity of cement plaster on brick walls.

6.5 Determine the height & breadth of RCC columns, lintels, beams, ceiling, sunshed, shelve, railing, drop wall, fins or louver (both sides), soffit in stairs & bottom surface of landing slab.

6.6 Calculate the quantity of cement plaster on RCC columns.

6.7 Calculate the quantity of cement plaster on RCC lintels/beams.

6.8 Calculate the quantity of cement plaster to RCC ceiling.

6.9 Calculate the quantity of cement plaster to RCC stair case.

7. Estimate the wood and steel work in door and window frames and shutters.

7.1 Identify the different sizes of doors and windows.

7.2 Determine the length & sizes of doors and windows (wooden, steel / aluminum) frames.

7.3 Calculate the quantity of wood work in door and windows frames (cum).

7.4 Determine the breadth & height of door and windows shutters.

7.5 Calculate the quantity of door and windows shutters, wooden, steel and glass fiber. (sqm).

8. Estimate the grill works.

8.1 Identify the different sizes of windows.

8.2 Determine the breadth & height of window openings.

8.3 Calculate the quantity of grill works(sqm).

8.4 Determine the breadth & height of verandah openings.

8.5 Calculate the quantity of grill works(sqm).

9. Estimate the patent stone flooring, mosaic work, tiles & skirting.

9.1 Determine the length & breadth of rooms and verandah for patent stone flooring.

9.2 Calculate the quantity of patent stone flooring in each floor.

9.3 Determine the length & breadth of rooms for mosaic works.

9.4 Calculate the quantity of mosaic works in each floor.

9.5 Determine the length & breadth of rooms for tiles work.

9.6 Determine the length & height of walls for tiles work.

9.7 Calculate the quantity of tiles work in each floor.

9.8 Determine the length & height of walls for skirting works.

9.9 Calculate the quantity of skirting works in each floor.

10. Estimate the lime terracing over RCC roof slab.

10.1 Determine the length, breadth & thickness of lime terracing.

10.2 Calculate the quantity of lime terracing.

10.3 Find out the quantity of each material required for lime terracing.

11. Estimate the quantity of white wash, color wash, snowcem wash, distemper, plastic paint where necessary.

11.1 Determine the length & breadth or height of walls and ceiling.

11.2 Calculate the quantity of area for white washing.

11.3 Determine the length & height of outside walls for color wash.
11.4 Calculate the quantity of area for color washing.
11.5 Determine the length & height of outside walls for snowcem wash.
11.6 Calculate the quantity of area for snowcem washing.
11.7 Determine the length & breadth or height of walls and ceiling.
11.8 Calculate the quantity of area for distempering.
11.9 Determine the length & breadth or height of walls and ceiling.
11.10 Calculate the quantity of area for plastic emulsion painting.

12. Estimate the painting and varnishing works to doors, windows, grills and skirting.

12.1 Identify the different sizes of doors, windows and grills.
12.2 Determine the length & height of each type of doors, windows and grills.
12.3 Calculate the quantity of area for painting and varnishing.
12.4 Determine the length & height of walls for skirting.
12.5 Calculate the quantity of area for skirting works.

13. Prepare an estimate of a septic tank and soak well with allied connections & fixtures.

13.1 Select a detail drawing of septic tank and soak well for 100 users.
13.2 Determine the necessary dimensions for detail estimate.
13.3 Estimate the different items of work of septic tank and soak well such as earth work in excavation & filling, brick flat soling, CC & RCC in base & top slab, brick works, cement plaster, patent stone flooring including all fittings.

14. Prepare an estimate of a RCC slab culvert and two span box culverts.

14.1 Select a detail drawing of RCC slab culvert and two span box culverts.
14.2 Determine the length, breadth & height or thickness of different members of the RCC slab culvert and two span box culvert.
14.3 Estimate the different items of work of RCC slab culvert and two span box culvert such as earth work in excavation & filling, brick flat soling, CC & RCC in base & top slab, brick works, cement plaster etc.

15. Prepare an estimate of a RCC retaining wall.

15.1 Select a detail drawing of a RCC retaining wall.
15.2 Determine the length, breadth & height or thickness of stem and base of the retaining wall.
15.3 Estimate the quantity of RCC work in stem and base of retaining wall.
15.4 Determine the measurement of reinforcement of the retaining wall.
15.5 Calculate the quantity of reinforcement required for the retaining wall.

16. Prepare an estimate of a wooden truss with CI sheet roofing.

16.1 Select a detail drawing of a king post roof truss.
16.2 Determine the length & sizes of different members of the truss.
16.3 Calculate the quantity of wood required for the truss in cum.
16.4 Determine the measurements of roofing area of the truss.
16.5 Calculate the quantity of CI sheet roofing in bundle / sqm.
16.6 Calculate the quantity of GI ridging in rm.
16.7 Calculate the quantity of painting works of the truss.

17. Prepare an estimate of a steel truss with CI sheet roofing.

17.1 Select a detail drawing of a steel truss.
17.2 Identify the length, sizes & thickness of different members of the truss.

17.3 Determine the measurements of each of the member of the truss.
17.4 Calculate the total quantity of steel required in kilogram/quintal/ton.
17.5 Determine the measurements of roofing area of the truss.
17.6 Calculate the quantity of CI sheet roofing in bundle / sqm.
17.7 Calculate the quantity of GI ridging in rm.
17.8 Calculate the quantity of painting works of the steel truss.

18. Prepare the cost of abstract of wooden & steel roof truss.

18.1 Identify the local rate of timber & other materials and labours for wooden truss.
18.2 List the items of work of a wooden truss.
18.3 Calculate the cost of abstract for wooden truss as per present market rate.
18.4 Identify the local rate of steel & other materials and labours for steel truss.
18.5 List the items of work of a steel truss.
18.6 Calculate the cost of abstract for steel truss as per present market rate.

19. Prepare an estimate of a steel structure.

19.1 Select a detail drawing of a steel structure.
19.2 Identify the length, sizes & thickness of different members of the steel structure.
19.3 Determine the measurements of each of the member of the steel structure.
19.4 Calculate the total quantity of steel required in kilogram/quintal/ton.
19.5 Calculate the quantity of painting works of the steel structure.

REFERENCE BOOKS

1. A Text Book of Estimating and Costing - by G S Birdie
2. Civil Estimating Quantity Surveying and Valuation - by Amarjit Agarwal
3. Estimating and Costing - by S C Rangwala
4. Estimating and Costing in civil engineering theory and practice - by B.N. Dutta
5. Tender documents of any building project prepared by Bangladesh Public Works Department (BPWD) or any other govt. organizations or any reputed civil engineering consulting firms in Bangladesh.

69054 Environmental Studies

T P C
2 0 2

AIMS

- To be able to understand the basic concepts of environment and environmental pollution.
- To be able to understand the concepts of ecology and ecosystems
- To be able to understand the basic concepts of environmental degradation relating to industrial production.
- To be able to understand the major environmental issues and problems.
- To be able to understand legislative measures to protect environment.

SHORT DESCRIPTION

Basic concepts of environment; natural resources; biogeochemical cycling; ecology and ecosystem; air; water; soil; solid waste management; development and environment; global environmental challenges; legislative protection of environment.

DETAIL DESCRIPTION

1. Understand the multidisciplinary nature of environmental studies.

1.1. Define environment, nature, pollution, pollutant, contaminant.
1.2. Describe the scope of environmental studies.
1.3. Describe the importance of environmental studies.
1.4. Describe the formation and structure of the Earth.
1.5. Describe the earth's natural system.
1.6. Describe the changing attitudes to the natural world.
1.7. Mention the main components of environment.
1.8. Define natural and man-made environment.
1.9. Distinguish between natural and man-made environment.

2. Understand the natural resources.

2.1. Define natural resources.
2.2. Classify natural resources.
2.3. Describe forest resources.
2.4. Describe water resources.
2.5. Describe mineral resources.
2.6. Describe food resources.
2.7. Describe energy resources.
2.8. Describe land resources.
2.9. Describe environmental problem relating to resources use.
2.10. Describe the role of an individual in conservation of natural resources.

3. Understand the biogeochemical cycling.

3.1. Define biogeochemical cycle.
3.2. Describe hydrologic cycle.
3.3. Describe carbon cycle.
3.4. Describe nitrogen cycle.
3.5. Describe oxygen cycle.

3.6. Describe phosphorus cycle.
3.7. Describe sulfur cycle.
3.8. Describe nutrient cycle.

4. Understand the ecology and ecosystem.

4.1. Define ecology and ecosystem.
4.2. Structure and function of an ecosystem.
4.3. Describe the components of ecosystem.
4.4. Explain the stability of ecosystem.
4.5. Describe ecological factors.
4.6. Describe interdependency between abiotic and biotic component.
4.7. Describe the meaning of following terms: species, population, community, ecological succession, community periodicity, climax community, ecological niche, habitat, plankton, nekton, ecological indicator, evolution, adaptation, producers, consumers, decomposers, food chains, food webs, ecological pyramids, bio-concentration, bio-magnification, biodiversity, threatened species, endanger species, extinct species, exotic species, biodiversity conservation and biogeography.
4.8. Describe energy flow in the ecosystem.
4.9. Describe the ecosystem of pond, ocean, estuary, grassland, cropland, forest, desert and mangrove.

5. Understand the air as a component of environment.

5.1. Define air.
5.2. Describe the composition of the clean dry atmospheric air at ground level.
5.3. Describe the atmospheric structure.
5.4. Define air pollution.
5.5. Describe major air pollutants and their impacts.
5.6. Describe the sources of air pollutants.
5.7. Explain the formation of photochemical smog and its effects.
5.8. Describe the effects of air pollution on vegetation, animal, human health and materials and resources.
5.9. Define sound and noise.
5.10. Describe the classification of sound.
5.11. Describe the effects of noise.

6. Understand the water as a component of environment.

6.1. Define water.
6.2. Describe the characteristics of water.
6.3. Describe the sources of water.
6.4. Describe the uses of water.
6.5. Explain that the water is a universal solvent.
6.6. Define water pollution, biological oxygen demand (BOD), effluent treatment plant (ETP).
6.7. Describe the sources of water pollution.
6.8. Describe the effects of water pollution.

7. Understand the soil as a component of environment.

7.1. Define soil.
7.2. Describe the constituents of soil.
7.3. Define soil pollution.
7.4. Describe causes soil degradation.

7.5. Describe the sources of soil pollution.
7.6. Describe the effects of soil pollution.

8. Understand the concept of solid waste management.

8.1. Define solid waste, refuse, garbage, rubbish, trashes, demolition and construction waste, e-waste, agricultural waste, pathological waste, radioactive waste, hazardous waste, 3R, 4R.
8.2. List the sources of solid waste.
8.3. Mention the classification of solid waste.
8.4. Mention the methods of collection of solid waste.
8.5. Describe the recycling of solid wastes.
8.6. Describe resource recovery from solid waste.
8.7. Describe the potential method of disposal of solid waste.
8.8. Describe control measures of urban and industrial wastes.

9. Understand the development and environment.

9.1. Define environmental ethics and environmental stress.
9.2. Describe environmental stress.
9.3. Define sustainable development.
9.4. Define urbanization.
9.5. Describe the causes of urbanization.
9.6. Describe the effects of urbanization on environment.
9.7. Define industrialization.
9.8. Describe the causes of industrialization.
9.9. Describe the effects of industrialization on environment.

10. Understand the global environmental challenges.

10.1. Define greenhouse gas and greenhouse effects.
10.2. Make a list of greenhouse gases and their contribution on greenhouse effects.
10.3. Describe the causes and consequences of greenhouse effects.
10.4. Describe acid rain.
10.5. Describe importance of ozone layer.
10.6. Define ozone depleting substances (ODS).
10.7. Describe ozone layer depletion mechanism.
10.8. Describe hazardous waste.
10.9. Describe chemicals pesticides.
10.10. Describe radioactive pollution.
10.11. Describe natural disaster.

11. Understand the legislative protection of environment.

11.1. Define environmental impact assessment (EIA) and environmental auditing (EA).

11.2. Mention environmental act and legislations prescribed for air, noise, water, soil and wild life protection.

11.3. Describe environmental conservation act 1995 in Bangladesh.

11.4. Describe the environment conservation rule 1997 in Bangladesh.

11.5. Describe the environmental framework in Bangladesh.

11.6. Describe The Montreal Protocol and The Kyoto Protocol.

11.7. Describe role of an individual in prevention of pollution.

REFERENCES:

1. Fundamentals of Environmental Studies, Mahua Basu and S. Xavier, Cambridge.
2. Ecology and Environment, P.D. Sharma, Rastogi Publications.
3. Basics of Environmental Science, Michael Allaby, Routledge.
4. Environmental Science, Jonathan Turk and Amos Turk, Sauders golden sunburst series.

65851 Accounting Theory & Practice

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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 diminishing 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