BANGLADESH TECHNICAL EDUCATION BOARD
Agargoan, Dhaka-1207.

4-YEAR DIPLOMA-IN-ENGINEERING PROGRAM
SYLLABUS (PROBIDHAN-2016)

CIVIL TECHNOLOGY

TECHNOLOGY CODE: **664**

3rd SEMESTER

DIPLOMA IN ENGINEERING
PROBIDHAN-2016

CIVIL TECHNOLOGY (664)

3rd 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	66431	Civil Engineering Drawing- 1	1	6	3	20	30	50	50	150
2	66432	Surveying-1	2	3	3	40	60	25	25	150
3	66433	Construction Process-1	2	3	3	40	60	25	25	150
4	66434	Civil Workshop Practice	0	3	1	0	0	25	25	50
5	65931	Mathematics-3	3	3	4	60	90	50	0	200
6	65913	Chemistry	3	3	4	60	90	25	25	200
7	65811	Social Science	3	0	3	60	90	0	0	150
Total			**14**	**21**	**21**	**280**	**420**	**200**	**150**	**1050**

66431 CIVIL ENGINEERING DRAWING - I

T	P	C
1	6	3

AIMS

- To enable to understanding civil engineering drawing scale.
- To prepare simple building drawing
- To assist to understand the code & symbols used in civil engineering drawing .
- To enable to learning detail drawing of building components.
- To enable in learning detail drawing of different types of foundation, culvert, Road & truss.

SHORT DESCRIPTION:

Civil engineering drawing scale, drawing of single storied building, code and symbols used in drawing; Detail drawing of different types of foundation ,flooring system in/c beam & slab, road, doors & windows, steel structure .

DETAIL DESCRIPTION:

THEORY :

1 Understand the basic principles of engineering drawing scale.

- 1.1 Define scale.
- 1.2 Identify & select the scale of FPS & MKS system.
- 1.3 State the need & importance of scale.

2 Understand the components of a single storied building.

- 2.1 Identify the name of different parts of building.
- 2.2 Define line plan of a building.
- 2.3 Describe the plan over plinth of simple building.
- 2.4 Explain the necessity of drawing, plan, elevation and section of building.

3 Understand the use and necessity of code and symbols in drawing.

- 3.1 State the use of code and symbols in drawing.
- 3.2 Explain the necessity of covering for steel reinforcement according to code.
- 3.3 Describe the significance of minimum thickness & size of structural member according to code.
- 3.4 Explain the necessity of hooks, bend and lapping as per code.
- 3.5 Define construction joint and expansion joint as per code.

4 Understand the significance of detail drawing.

- 4.1 Define the meaning of detail drawing.
- 4.2 Mention the necessity of detail drawing.
- 4.3 List different types of foundation.
- 4.4 List different types of RCC footing.
- 4.5 List different types of flooring system.

5 Understand the features of pile.

- 5.1 Define the terms pile.
- 5.2 Mention the functions of pile cap.
- 5.3 List different types of piles used.
- 5.4 Explain the necessity of piles grouping.

6 Understand the features of doors and windows.

- 6.1 List different types of doors.
- 6.2 Label different parts of doors.
- 6.3 List different types of windows.
- 6.4 Label different parts of windows.

7 Understand the features of road

7.1 List different types of road.
7.2 List different types of joints in rigid pavement.
7.3 State the meaning of right of way.
7.4 Identify different components of a rigid pavement.
7.5 Identify different components of a flexible road.

8 Understand the features of steel structure.

8.1 Define steel structure with truss & I- Joist.
8.2 Define the term truss.
8.3 Label different parts of a wooden truss.
8.4 Label different parts of a steel truss.
8.5 Distinguish between king post and queen post truss.
8.6 Define I-Joist.
8.7 Label different parts of a building made by I-Joist.
8.8 Define the steel structure joints with rivets & welding.
8.9 Define the flooring system of steel structure with decking panel & its fixing system.

PRACTICAL:

1 Prepare drawing of a single storied building with verandah

1.1 Draw the line plan of a single storied simple building with verandah.
1.2 Draw plan over plinth of simple building with verandah from the line plan as started in 2.1.
1.3 Draw front and side elevation of the simple building started in 2.2
1.4 Draw the cross section of simple building as started in 2.2
1.5 Assemble plan over plinth, sections and elevations of simple building with proper dimensions, heading and title block in proper places on one sheet according to given data.
1.6 Draw the isometric view of a given single roomed building showing front and one side elevation.

2 Apply different types of code in civil engineering drawing.

2.1 Use the different types of design code.
2.2 Use clear cover of different component of building for protection of reinforcement according to code.
2.3 Use anchorage of reinforcement according to code.
2.4 Use minimum thickness of structural members according to code.
2.5 Use minimum width of beam and least dimension of column according to code.
2.6 Use minimum requirement of reinforcement in footing, column, beam & slab according to code.

3 Apply different symbols in civil engineering drawing.

3.1 Draw the standard hooks and bends according to code.
3.2 Draw the compression joints in reinforcement bar.
3.3 Draw the tensile joints in reinforcement bars.
3.4 Prepare a bar-schedule with specification of reinforcement bars.
3.5 Draw the construction, expansion & contraction joints.

4 Prepare detail drawing of brick spread foundation and RCC footing.

4.1 Draw the brick spread foundation for load bearing wall with the given data or rule of thumb in/c showing of offsets & position of DPC.
4.2 Draw the details of basement floor showing damp proofing system.
4.3 Draw the brick wall with RCC footing , Grade beam & Floor beam.
4.4 Draw the RCC continous (inverted T-beam) footing.
4.5 Draw the RCC cantilever footing.

5 Prepare the detail drawing of pile and pile cap.

5.1 Draw the detail drawing of RCC cast-in-situ piles.
5.2 Draw sections of a square pre-cast RCC pile.
5.3 Draw the cross-section of a pile cap over a group of piles.
5.4 Draw the shoe of a pile.

6 Construct detail drawing of floor.

6.1 Draw timber floor.
6.2 Draw typical cement concrete (CC) floor over single brick flat soling.
6.3 Draw the typical reinforced cement concrete (RCC) floor.

7 Prepare detail drawing of doors and windows (wooden/steel/aluminum).

7.1 Draw the elevation of a paneled door.
7.2 Draw horizontal section of paneled door cutting plane passing through panels.
7.3 Draw vertical section of paneled door cutting plane passing through panels.
7.4 Draw the horizontal cross-section and elevation of metal window.
7.5 Draw the horizontal and vertical section of a fully glazed window.

8 Prepare the detail drawing of road.

8.1 Draw the right of way of a national highway in the embankment.
8.2 Draw the cross-section of bituminous road on embankment showing foundation details.
8.3 Draw the cross-section of rigid pavement on embankment showing foundation details.

9 Prepare detail working drawing of wooden truss.

9.1 Draw elevation of king post/queen post roof truss on 25cm thick brick wall.
9.2 Make detail working drawing of heel joint of wooden truss.
9.3 Make detail working drawing of ridge of wooden truss.
9.4 Make detail working drawing of joint (intermediate point) of beam in wooden truss.

10 Prepare working drawing of steel truss.

10.1 Draw elevation of steel truss (pratt truss/warren truss) rests on 25cm x25cm RCC column.
10.2 Make detail working drawing of heel joint of steel truss rests on RCC column.
10.3 Make detail working drawing of ridge joint of steel truss.
10.4 Make detail working drawing of joint on the rafter of steel truss.
10.5 Make detail drawing of joint on the tie beam of steel truss.

11 Prepare the drawing of plan, elevation and section of a single storied steel building.

11.1 Draw a plan of a two storied steel building using I-Joist.
11.2 Draw the elevation of a two storied steel building using I- Joist .
11.3 Draw the section of a two storied steel building using I-joist and decking panel as floor system.
11.4 Draw the section of folded decking panel floor system in/c RCC slab resting on decking panel

REFERENCE BOOKS

1. Structural Detailing - Peter H Newton
2. Civil Engg. Drawing - Guru Charan Sing

66432 Surveying- 1

T	P	C
2	3	3

Objectives

To provide the students with an opportunity to acquire knowledge and skills about:

1. Conduct the survey work with chain and compass and plane table.
2. Conduct cadastral survey.
3. Record surveyed data and plot the surveyed area.
4. Enlarge or reduce the map and calculate the area by using small instrument.

Short Description

Introduction to surveying; chain surveying; Compass surveying; Plane table surveying; Cadastral surveying.

DETAIL DESCRIPTION

Theory:

1. The concepts of surveying

- 1.1 Explain the meaning of surveying
- 1.2 Discuss the purpose of surveying.
- 1.3 Classify Primary divisions of survey.
- 1.4 Explain field work.
- 1.5 Explain office work.
- 1.6 Acquaint with survey instruments and their care and adjustment.
- 1.7 Discuss the classification of surveying based of shape of earth nature of field object of surveying and instrument employed.
- 1.8 Differentiate plane survey and geodetic survey.

2. The basic principle of chain surveying.

- 2.1 Describe the purpose and scope of chain surveying.
- 2.2 Describe basic principle of chain surveying.
- 2.3 Explain chain line, base line, tie line, check line, station points.
- 2.4 Explain ill-conditioned and well conditioned triangle.
- 2.5 Rules to be observed while chaining.

3. The main instrument used in chain surveying.

- 3.1 List the equipment and accessories used in chain surveying.
- 3.2 Describe Gunter's chain, Engineer's chain, meter chain, ranging rod, cross-staff, offset rod, plumb-bob, arrows, tapes, whites.
- 3.3 Explain the method of folding and unfolding a chain.
- 3.4 Describe the use of steel band chain.
- 3.5 Describe the use of linen, steel and invar tape.
- 3.6 Explain the use of arrows, ranging rod, offset rod, cross-staff, prism square, box-sextant, clinometer.

4. Use optical square.

- 4.1 Describe the principle of optical square.
- 4.2 Explain the construction and use of optical square.
- 4.3 Explain the procedure of checking and adjustment of optical square.

5. Procedure of chain surveying.

- 5.1 Explain reconnaissance surveying.
- 5.2 Describe the procedure of chain surveying.
- 5.3 State the considerations of selecting station points.
- 5.4 Describe the procedure of ranging of survey line.
- 5.5 Distinguish between direct and indirect ranging.
- 5.6 Describe the procedure of indirect ranging (reciprocal ranging) on sloping ground.
- 5.7 Describe the procedure of measuring linear distances with the help of chain and tape.

6. Measuring offset.

- 6.1 Define offset perpendicular offset and oblique offset.
- 6.2 Describe the procedure of measuring offset by offset rod and tape.
- 6.3 Describe the procedure of measuring offset by optical square.
- 6.4 Describe the different methods of locating unknown points with reference to two known points.

7. The booking procedure of field book.

7.1 State single line and double line field book.
7.2 Describe the procedure of booking in a single line field book.
7.3 Describe the procedure of booking in a double line field book.
7.4 Describe precautions in booking field notes.

8. Chaining across obstacles.

8.1 Describe the procedure of setting out perpendicular by chain and tape when the point is accessible.
8.2 Describe the procedure of setting out perpendicular by chain and tape when the point is inaccessible.
8.3 Describe the procedure of chaining across obstacles when the chaining obstructed.
8.4 Describe the procedure of chaining across obstacles when the vision obstructed
8.5 Describe the procedure of chaining across obstacles when both chaining and vision obstructed.

9. Errors in chaining.

9.1 List the errors in chaining.
9.2 Identify the causes for which a chain may be too-long or too-short.
9.3 Calculate the correct distance and correct area from measured distance and measured area when the chain was too-long or too-short.
9.4 Explain cumulative and compensating errors with causes of those errors.
9.5 List the mistakes in chain surveying.
9.6 List the name of necessary correction to be applied to the measured length of a line in order to obtain its true length.
9.7 Explain the formula for correction of tapes for absolute length, variation of temperature, variation of pull, sag and slope.
9.8 Computer correct length of line after necessary correction due to variation of pull, sag and slope.
9.9 Explain normal tension.
9.10 Explain degree of accuracy in chaining.
9.11 Discuss about precise of linear measurements.

10. Chain survey map.

10.1 List the instrument and materials required for plotting a survey map.
10.2 Discuss different types of scale.
10.3 State suitable scale for plotting a map.
10.4 Describe the procedure of plotting a survey map from field book.
10.5 Draw conventional symbols used in plotting maps.

11. Different methods of computing areas.

11.1 Describe the units of measurements in plane surveying.
11.2 Describe different methods of computing areas within regular and irregular perimeters.
11.3 Carry out the field work for calculation of areas within regular and irregular perimeters.
11.4 Compute the area along boundary by mid-ordinate rule, average ordinates rule, trapezoidal rule, and Simpson's rule.

12. The methods of calculation of area from a given map.

12.1 Describe the procedure of computation of area from a map with the help of planimeter.
12.2 Calculate an area with the help of planimeter.
12.3 Describe the procedure of computation of area from a map analytically by dividing the map into triangles, squares, trapezoids (Parallel lines).
12.4 Calculate an area from a map analytically.
12.5 Describe the procedure of computation of area from a given map with the help of acre comb.
12.6 Calculate an area from a map with the help of acre comb.

13. Understand about small instruments.

13.1 State the use of planimeter.
13.2 State the use of pantograph.
13.3 State the use of acre comb.
13.4 Describe the procedure of reducing and enlarging a map with the help of pantograph.
13.5 Describe the procedure of measuring angle of elevation and depression with the help of abney level.

14. Basic terms used in compass surveying.

14.1 Describe the purpose and scope of compass surveying.
14.2 List the instrument and accessories required for compass survey.
14.3 Define terms- meridian, true meridian, magnetic meridian, arbitrary meridian, bearing, true bearing, magnetic bearing, arbitrary bearing, magnetic declination, dip of the needle, deflected angle, exterior angle, interior angle.
14.4 State the method to determine the direction of meridian by sun's shadow.
14.5 State the method to determine the direction of magnetic meridian by compass needle.

15. Conversion of bearing.

15.1 Explain for bearing and back bearing.
15.2 Compute back bearing from fore bearing and fore bearing from back bearing.
15.3 Explain whole circle bearing and reduced bearing and necessity of converting them.
15.4 Convert whole circle bearing to reduced bearing and reduced bearing to whole circle bearing.

16. The procedure of compass surveying.

16.1 Describe prismatic, surveyors and trough compass.
16.2 Differentiate prismatic and surveyors compass.
16.3 State the use of different compass.
16.4 Describe the procedure of compass survey.
16.5 Define local attraction.
16.6 Detect local attraction and correct the observed bearings.

17. Basic concept of plane table surveying.

17.1 State the purpose and scope of plane table surveying.
17.2 List the instruments and accessories required for plane-table survey.
17.3 Describe the procedure of setting up plane table.
17.4 Explain the term orientation.
17.5 Describe orientation by magnetic needle and back sighting.
17.6 Name the methods of plane table survey.
17.7 Describe radiation, intersection, traversing and resection methods.
17.8 Define two points problem.
17.9 Define three points problem.
17.10 Describes the advantages and disadvantage of plane table survey.

20. Basic concept of cadastral survey.

20.1 Define cadastral survey.
20.2 Define the purpose of cadastral survey.
20.3 Identify scale used in cadastral survey.
20.4 List the equipment and accessories used in cadastral survey.
20.5 Define the terms Quadrilaterals, intersections, shikmi, chanda, check line, field khaka, revenue survey, revisional settlement.
20.6 State the stages of cadastral survey.
20.7 Explain the procedure of preparing a cadastral survey map.
20.8 Describes the rules for numbering the plots.

21. Identify the boundary of property.

21.1 Describe the procedure for demarcation of boundary lines of property.
21.2 Describe the procedure for locating of lost boundary.

Practical:

1. Identify the different instruments and accessories required for chain survey.
2. Test and adjust chain.
3. Measure length of line by chain and tape.
4. Set perpendiculars with the help of chain and tape.
5. Set parallel lines with chain and tape.
6. Test and adjust an optical square.
7. Set perpendiculars with the help of optical square.
8. Measure distances across obstacles.

9. Conduct a chain survey of a field.
10. Prepare a chain survey map.
11. Calculate the area of map with the help of planimeter.
12. Identify the different instruments and accessories required in compass survey.
13. Measure magnetic bearing by prismatic and surveyors compass.
14. Identify the different instruments and accessories required in plane table survey.
15. Locate the position to point with the help of plane table.
16. Plot the map of a place by radiation, intersection and traversing.
17. Locate the position of the instrument station of the plan of the plane table by solving three points problem.
18. Locate the position of the instrument station on the plan of the plane table by solving three points problem.
19. Calculate the area from a map with the help of planimeter graphically and analytically.
20. Enlarge a given map up to the desired size with the help of pantagraph.
21. Reduce a given map up to the desired size with the help of pantagraph.
22. Calculate the angle of elevation and angle of depression with the help of abney level.
23. Measure the area of a plot from mouza map.
24. Locate the position of a point in the field which is already plotted on the mouza map.
25. Locate the boundary line of a property with the help of chain, tape and plane table which is already plotted on the mouza map.

Reference Book:

1. Surveying and Levelling - T. P. Kanatker
2. Syrveying - Norman Thomas
3. Surveying - Aziz & Shahjahan
4. Plane & Geodetic Survey - D. Clark
5. Surveying - B. C. Punmia
6. Text book of surveying - S.K.Husain, M.S Nagraj.

66433 CONSTRUCTION PROCESS-I

T	P	C
2	3	3

OBJECTIVES:

At the end of course the students will be able to:

- Apply relevant theory and practice of concrete construction and its quality control methods.
- Perform skills for construction work and Its supervision.
- understand the process, techniques and materials used in different types of masonry.

SHORT DESCRIPTION

Concrete, Brick masonry, Composite masonry, Foundation, Partition wall, Cavity wall.

DETAIL DESCRIPTION

Theory:

1 Understand the features of concrete.

1.1 State the meaning of concrete.
1.2 Mention the different Types of concrete.
1.3 List the uses of concrete in the construction industry.
1.4 List the ingredients of different Types of concrete.
1.5 Mention the functions of ingredients of concrete.
1.6 Mention the advantages and limitations of concrete.
1.7 Write the characteristics of materials used in concrete.

2 Understand the properties of concrete.

2.1 Define the terms: strength, durability, workability, laitance and segregation.
2.2 State the meaning of water-cement ratio.
2.3 List the factors affecting the strength of concrete.
2.4 List the factors affecting the durability of concrete.
2.5 List the factors affecting the workability of concrete.
2.6 Describe the effect of water-cement ratio on the strength of concrete.

3 Understand the techniques of proportioning, mixing, transporting, placing and compaction of concrete.

3.1 Explain the significance of proportioning the ingredients of concrete.
3.2 List the methods of concrete mix design.
3.3 Describe how batching of concrete mix is achieved by volume and weight.
3.4 Compare the various processes used to mix concrete.
3.5 Describe the ready mix concrete.
3.6 Mention the advantages and limitations of ready mix concrete.
3.7 State the various methods of transporting concrete.
3.8 Mention the sequence of placing concrete in different situations.
3.9 Describe the processes of compaction of concrete.

4 Understand the concept of curing of concrete.

4.1 Define of deferent type of concrete.

4.2 State the meaning of curing.

4.3 State how the curing process affects the strength of hardened concrete.

4.4 Describe the different methods of curing.

4.5 Mention the advantages and limitations of various methods of curing.

5 Understand the features of different special types of concrete.

5.1 Compare the properties of polymer concrete and super plasticized concrete.

5.2 Mention the procedure used in the production of Ferro-cement construction.

5.3 Explain the term pre-stressed concrete.

5.4 Mention the procedure used in the production of pre-stressed concrete.

6 Understand the supervisory aspects of concrete construction.

6.1 List the special precautions to be observed for concreting under water.

6.2 List the special precautions to be observed for concreting in cold weather.

6.3 List the special precautions to be observed for concreting in hot weather.

6.4 List the factors to be considered while supervising good quality concrete production.

6.5 List the factors to be considered while supervising good quality RCC construction.

6.6 List the factors to be considered while supervising good quality pre-stressed concrete construction.

7 Understand the aspects of foundation :

7.1 Define the terms of 'foundation, deep foundation, shallow foundation'.

7.2 Types of different **foundation.**

7.3 Draw the sketches of strip footing, wide strip footing, eccentrically loaded footing, raft foundation, combined footing, stepped strip foundation, grillage foundation.

7.4 Describe the following methods of casting and placing concrete pile foundation:

a. Cases cast-in-situ concrete pile.

b. Uncases cast-in-situ concrete pile.

c. Pre-cast concrete pile.

8 Understand the features of brick masonry.

8.1 State the meaning of brick masonry.

8.2 List the tools required for brick masonry.

8.3 State the specific uses of brick masonry tools.

8.4 Distinguish among different types of masonry structures.

8.5 Define the following terms: header, stretcher, lap, course, bed, joint, closer.

8.6 Identify the defects in brick masonry.

8.7 List the factors to be considered while supervising brick masonry works.

9 Understand the purpose of bond in brick masonry.

9.1 State the meaning of bond in brick masonry.

9.2 Mention the functions of good brick bonding.

9.3 Describe the steps for brick lying.

9.4 Identify different types of bonds in brick masonry.

9.5 Draw the neat sketches of different types of bonds in brick masonry.

9.6 Differentiate between English and Flemish bond.

9.7 Describe the bonding arrangements around openings and corners.

10 Understand the features of composite masonry.

10.1 State the meaning of composite masonry.

10.2 Identify different types of composite masonry.

10.3 Sketch details of brick backed stone slab masonry.

10.4 Mention the advantages and limitations of using reinforced brick masonry.

10.5 Mention the advantages and limitations of hollow clay block masonry.

11 Understand the features of partition wall.

11.1 State the meaning of partition wall.

11.2 Mention the common requirement of partition walls.

11.3 Mention the functions of partition wall.

11.4 List different types of partition walls.

11.5 Describe the procedure of construction of the following types of partition walls:

a. Brick partition wall
b. Concrete partition wall
c. Glass partition wall
d. Aluminum partition wall
e. Light weight partition wall(timber stud work, Ferro-cement plate, hollow blocks)

11.6 Mention the advantages and limitations of each type of partition walls.

11.7 Differentiate among the load bearing (main) walls and partition walls.

12 Understand the features of cavity wall.

12.1 State the meaning of cavity wall.

12.2 Explain the necessity of cavity wall construction.

12.3 Sketch the general features of cavity walls.

12.4 Mention the advantages and limitations of cavity walls over solid brick walls.

12.5 Identify different types of wall ties used in cavity wall.

12.6 Determine the spacing of wall ties in used in cavity wall.

12.7 Describe the construction procedure of cavity wall.

12.8 Mention the precautions to be taken while construction of cavity wall.

Practical:

1 Draw the grading curves for various samples of aggregates and find out the FM value.

2 Perform slump test of different concrete works.

3 Conduct cube test for concrete and interpret the results.
4 Conduct cylinder test for concrete and interpret the results.
5 Conduct brick masonry work to erect pillars of sizes 25 cm x 25 cm to 50 cm x 50 cm with English bond up to 5 layers .
6 Perform brick masonry work to erect pillars of sizes 25 cm x 25 cm to 50 cm x 50 cm with Flemish bond up to 5 layers.
7 Construct sample corner (L) joints of 25 cm to 50 cm width English bond brick wall up to 5 layers.
8 Construct sample corner (L) joints of 25 cm to 50 cm width Flemish bond brick wall up to 5 layers.
9 Construct sample tee (T) joints of 25 cm to 50 cm width English bond brick wall up to 5 layers.
10 Construct sample tee (T) joints of 25 cm thick wall with 50 cm thick wall Flemish bond brick wall up to 5 layers.
11 Construct sample cross (+) joints of 25 cm to 37.5 cm width English bond brick wall.
12 Construct sample cross (+) joints of 12.5 cm to 25 cm width Flemish bond brick wall.

REFERENCE BOOKS

1	Building construction	Dr. B C Punmia
2	Building construction	G J Kulkarni
3	Building construction	S P Aurora and S P Brindra

66434	CIVIL WORKSHOP PRACTICE	T	P	C
		0	3	1

AIMS

To provide the students with an opportunity to acquire knowledge and skills to

- Perform Occupational Safety and Health (OSH) practice in wood shop.
- Make Hazard report in wood shop.
- Wood shop machines, tools, equipment.
- Perform different carpentry work in wood shop.
- Take care of wood working machine, tools and equipments.

SHORT DESCRIPTION

Wood working: Occupational Safety and Health (OSH)practice, common hand tools, measuring instrument, cutting , planning and finishing of wood piece, making different types of joint, finishing of the joint in wood shop.

Practical :

1 Observe the safety procedure, occupational safety and health(OSH) in wood shop:
- 1.1. State general safety precaution in wood shop (OSH) practice.
- 1.2. Familiar to use important PPE (Personal Protective Equipment) in wood shop.

2 Demonstrate the application of basic wood working hand tools.
- 2.1 Identify common and basic hand tools required in carpentry works.
- 2.2 Use basic hand tools required to undertake a simple carpentry exercise.
- 2.3 Carryout minor maintenance and sharpening of tools used for wood works.
- 2.4 Follow safety procedure during working in the wood shop.
- 2.5 Clean work place and store tools and equipment.

3 Demonstrate the application of measuring instruments for wood works.
- 3.1 List & identify the measuring and layout tools.
- 3.2 Take measurement with folding rule, steel rule and steel tape.
- 3.3 Measure and Mark of wood works as required.
- 3.4 Check the measurement of wood works.

4 Apply the process of layout.
- 4.1 Explain the necessity of layout
- 4.2 Calculate materials required for a given job.
- 4.3 Observe the safe procedure in laying out work pieces.

5 Show skill in sawing, planning and cutting of wood piece.
- 5.1 Identify the operations (different types of sawing).
- 5.2 Perform different types of sawing on different parts
- 5.3 Follow safety procedures during sawing.
- 5.4 Identify the planning tools for required job.
- 5.5 Follow the procedure of planning.
- 5.6 Select the right size and types of cutting tools.
- 5.7 Observe the safe procedure for cutting.
- 5.8 Clean work place and store tools and equipments.

6 Show skill in making different types of wood joint.
- 6.1 Name the different types of joint used in wood work.
- 6.2 Select appropriate size of wood used in the job.
- 6.3 Select tools and equipment for the specific job.
- 6.4 Put marking the wood for jobs.(As per Drawing)
- 6.5 Make cross lap joint, T-halving joint, tenon and mortise joint, half lap dovetail joints corner dove tail joint.
- 6.6 Make hole in wood, counter shank and wood joint with screw and nailing.
- 6.7 Clean work place and store tools and equipments.

7 Apply polish to wooden furniture.
- 7.1 Identify common materials used in polish on wooden surface.
- 7.2 Select sand paper of different grads.
- 7.3 Perform sand papering on wooden surface.
- 7.4 Apply putty on wooden surface.

7.5 Show the procedure of polish.
7.6 Apply polish along the grain of wood.
7.7 Clean work place and store tools and equipments.

8 Apply the basic rules of free hand sketching of furniture.
8.1 Identify the required materials for free hand sketching
8.2 Draw working drawing of the following furniture.
a. Tool
b. Book self
c. Office desk
d. Reading table
e. Armless chair

9 Prepare a complete job as project work (simple wooden furniture sitting Tool, Book self, Office desk, Reading table, Armless chair)
9.1 Perform one of the following furniture with costing/ including finishing work(varnishing / Lacquer)
a. Tool
b. Book self
c. Office desk
d. Reading table
e. Armless chair
9.2 Clean work place , store tools and equipments.

REFERENCE BOOKS

1. Wood & Wooden Work — By Sree Derandra Chandra Chouwdory.
2. Prathomic Fitting Sikkha — By Hemanta Kumar Bhattacharia
3. Wood working Drawing-1 — By BTEB

65931 **MATHEMATICS -3** **T P C**
3 3 4

AIMS

- To enable to calculate the areas of regular polygons, hexagons, octagon, hydraulic mean depth (HMD) of a channel, area occupied by water of circular culvert. Excavation work.
- To provide the ability to calculate volume of regular solids like pyramid frustum of pyramid, prismoid, wedge and area of curved surfaces.
- To enable to use the knowledge of gradient of a straight line in finding speed, acceleration etc.
- To enable to use the knowledge of conic in finding the girder of a railway bridge, cable of a suspension bridge and maximum height of an arch.
- To make understand the basic concept and techniques of composition and resolution of vectors and computing the resultant of vectors.

- **SHORT DESCRIPTION**

Menstruation : Area of rectangles, squares, triangles, quadrilaterals, parallelograms, rhombus, trapezium, circle, sector, segment; Volume of rectangular solids, prism, parallelepiped, pyramids, cones, spheres, frustum of pyramid and cone; Area of curved surface of prism, Cylinder cone, pyramid and frustum of cone.

Co-ordinate Geometry: Co-ordinates of a point, locus and its equation, straight lines, circles and conic.

Vector: Addition and subtraction, dot and cross product.

DETAIL DESCRIPTION

MENSURATION:

1 Apply the concept of area of triangle.

1.1 Find the area of triangle in the form,

i) $A=\frac{\sqrt{3}}{4}a^2$, a = length of a side of equilateral triangle.

ii) $A=\frac{c}{4}\sqrt{4a^2-c^2}$, where a = length of equal sides, c = third side.

iii) $A=\sqrt{s\ (s-a)(s-b)(s-c)}$, where a, b, c = length of the sides of a triangle and 2s is the perimeter of the triangle.

1.2 Use formula in 1.1 to solve problems.

2 Apply the concept of finding areas of quadrilateral & Parallelogram & finding areas of rhombus & trapezium.

2.1 Define quadrilateral & Parallelogram.
2.2 Find the areas of quadrilateral when off sets are given.
2.3 Find the areas of a parallelogram.
2.4 Solve problems using above formulae.
2.5 Define rhombus & trapezium.
2.6 Find the areas of rhombus when the diagonals are given.
2.7 Find the areas of trapezium in terms of its parallel sides and the perpendicular distance between them.
2.8 Solve problems related to rhombus & trapezium.

3 Apply the concept of finding areas of regular polygon.

3.1 Define a regular polygon.
3.2 Find the area of a regular polygon of n sides, when
  i) The length of one side and the radius of inscribed circle are given.
  ii) The length of one side and the radius of circumscribed circle are given.
3.3 Find the area of a regular.
  a) Hexagon
  b) Octagon when length of side is given.

3.4 Solve problems of the followings types:
A hexagonal polygon 6 m length of each side has a 20 cm width road surrounded the polygon. Find the area of the road.

4 Understand areas of circle, sector and segment.

4.1 Define circle, circumference, sector and segment.
4.2 Find the circumference and area of a circle when its radius is given.
4.3 Find the area of sector and segment of a circle.
4.4 Solve problems related to the above formulae.

5 Apply the concept of volume of a rectangular solid.

5.1 Define rectangular solid and a cube.
5.2 Find geometrically the volume of a rectangular solid when its length, breadth and height are given.
5.3 Find the volume and diagonal of a cube when side is given.
5.4 Solve problems with the help of 6.2 & 6.3.

6 Apply the concept of surface area, volume of a prism, parallelepiped and cylinder.

6.1 Define a prism, parallelepiped and a cylinder.
6.2 Explain the formulae for areas of curved surfaces of prism, parallelepiped and cylinder.
6.3 Explain the formulae for volume of prism, parallelepiped and cylinder when base and height are given.
6.4 Solve problems related to 7.2, 7.3.

7 Apply the concept of the surface area, volume of pyramid, cone and sphere.

7.1 Define pyramid, cone and sphere.
7.2 Explain the formula for areas of curved surfaces of pyramid, cone and sphere.
7.3 Explain the formula for volumes of pyramid, cone and sphere.
7.4 Solve problems related to 8.2, 8.3.

CO-ORDINATE GEOMETRY

8 Apply the concept of co-ordinates to find lengths and areas.

8.1 Explain the co-ordinates of a point.
8.2 State different types of co-ordinates of a point.
8.3 Find the distance between two points (x_1, y_1) and (x_2, y_2).
8.4 Find the co-ordinates of a point which divides the straight line joining two points in certain ratio.
8.5 Find the area of a triangle whose vertices are given.
8.6 Solve problems related to co-ordinates of points and distance formula.

9 Apply the concept of locus & the equation of straight lines in calculating various Parameter.

9.1 Define locus of a point.
9.2 Find the locus of a point.
9.3 Solve problems for finding locus of a point under certain conditions.
9.4 Describe the Equation x=a and y=b and slope of a straight line.
9.5 Find the slope of a straight line passing through two point $(x_1, y_1,)$ and (x_2, y_2).
9.6 Find the equation of straight lines:
(i) Point slope form.
(ii) Slope Intercept form.
(iii) Two points form.
(iv) Intercept form.
(v) Perpendicular form.
9.7 Find the point of intersection of two given straight lines.
9.8 Find the angle between two given straight lines.
9.9 Find the condition of parallelism and perpendicularity of two given straight lines.
9.10 Find the distances of a point from a line.

10 Apply the equations of circle, tangent and normal in solving problems.

10.1 Define circle, center and radius.

10.2 Find the equation of a circle in the form:

(i) $x^2 + y^2 = a^2$

(ii) $(x - h)^2 + (y - k)^2 = a^2$

(iii) $x^2 + y^2 + 2gx + 2fy + c = 0$

10.3 Find the equation of a circle described on the line joining (x_1, y_1) and (x_2, y_2).

10.4 Define tangent and normal.

10.5 Find the condition that a straight line may touch a circle.

10.6 Find the equations of tangent and normal to a circle at any point.

10.7 Solve the problems related to equations of circle, tangent and normal.

11 Understand conic or conic sections.

11.1 Define conic, focus, Directorx and Eccentricity.

11.2 Find the equations of parabola, ellipse and hyperbola.

11.3 Solve problems related to parabola, ellipse and hyperbola.

VECTOR :

12 Apply the theorems of vector algebra.

12.1 Define scalar and vector.

12.2 Explain null vector, free vector, like vector, equal vector, collinear vector, unit vector, position vector, addition and subtraction of vectors, linear combination, direction cosines and direction ratios, dependent and independent vectors, scalar fields and vector field.

12.3 Prove the laws of vector algebra.

12.4 Resolve a vector in space along three mutually perpendicular directions

12.5 Solve problems involving addition and subtraction of vectors.

13 Apply the concept of dot product and cross product of vectors.

13.1 Define dot product and cross product of vectors.

13.2 Interpret dot product and cross product of vector geometrically.

13.3 Deduce the condition of parallelism and perpendicularity of two vectors.

13.4 Prove the distributive law of dot product and cross product of vector.

13.5 Explain the scalar triple product and vector triple product.

13.6 Solve problems involving dot product and cross product.

Reference

SL No	Athour	Title	Publication
01	G. V. Kumbhojkar	Companian to basic Maths	Phadke Prakashan
02	Murary R Spigel	Vector & Tensor Analysis	Schaum's Outline Series
03	Md. Abu Yousuf	Vector & Tensor Analysis	Mamun Brothers
04	Rahman & Bhattacharjee	Co-ordinate Geometry & Vector Analysis	H.L. Bhattacharjee
05	Md. Nurul Islam	Higher Mathematics	Akkhar Patra Prakashani

65913	CHEMISTRY	T	P	C
		3	3	4

Objectives:

1. **To Understand Mole Concept And Volumetric Analysis.**
2. **To Represent The Formation Of Bonds In Molecules.**
3. **Able To Select Appropriate Materials Used In Construction.**
4. **Apply Knowledge To Enhance Operative Life Span Of Engineering Material And Structure By Various Protective Methods.**

Short Description: Chemistry Is A Basic Science Subject Which Is Essential To All Engineering Courses. It Gives Knowledge Of Engineering Material, Their Properties Related Application And Selection Of Material For Engineering Application. It Is Intended To Teach Student The Quality Of Water And Its Treatment As Per The Requirement And Selection Of Various Construction Materials And Their Protection By Metallic And Organic Coatings. The Topics Covered Will Provide Sufficient Fundamental As Well As Background Knowledge For The Particular Branch.

Section - 01 (Physical and Inorganic Chemistry)

1. Atomic Structure and Chemical Bond

1.1 Definition of Element, Atoms, Molecules, Fundamental Particle of Atom, Their Mass, Charge, Location.
1.2 Definition of Atomic Number, Mass Number, Isotope, Isotone and Isobar.
1.3 Electronic Configuration Based on Hunds Rule, Aufbau's Principle, Paulis Exclusion Principle
1.4 Definition Of Atomic Weight, Equivalent Weight of An Element, Molecular Weight, Mole In Terms of Number, Mass, Volume.
1.5 Define Symbol, Valency And Formula.
1.6 Explain Chemical Bond, Octet Rule.
1.7 Explain Formation of Various Types of Chemical Bonds: Covalent, Ionic, Co-Ordinate Bond.
1.8 Explain The Bonding Along With Example CH_4 , H_2, O_2, Nacl, $Mgcl_2$.
1.9 Explain Quantum Number, Orbit And Orbital.

2. Ionic Equilibrium

2.1 Concept of Acid, Base, Salt and Types Of Salts.
2.2 Ph, Poh, Ph Scale.
2.3 Basicity of An Acid and Acidity of A Base.
2.4 Normality, Molarity, Molality, Volumetric Analysis.
2.5 Titration and Indicator.
2.6 Buffer Solution and Its Mechanism.

3. Chemical Reaction, Oxidation and Reduction.

3.1 Define Chemical Reaction And Explain The Various Type Of Chemical Reaction.
3.2 Explain The Full Meaning Of A Chemical Equation.
3.3 Concept of Catalyst.
3.4 Modern Concept of Oxidation and Reduction.
3.5 Simultaneous Process of Oxidation and Reduction.
3.6 Explain The Oxidation Number.

4. Water Treatment

4.1 Concept of Hard And Soft Water
4.2 Hardness of Water
4.3 Describe The Softening Method Of Permuted Process And Ion Exchange Resin Process.
4.4 Advantage and Disadvantage of Hard Water in Different Industries.
4.5 Water Treatment Plant Visit and Reporting.

5. Corrosion And Alloy

5.1 Types of Corrosion. (Dry and Wet Corrosion)
5.2 Atmospheric Corrosion, Types Of Atmospheric Corrosion And Their Mechanism, Oxide Films Factors Affecting Atmospheric Corrosion.
5.3 Electrochemical Corrosion, Mechanism of Electrochemical Corrosion.Types of Electrochemical Corrosion. Factors Affecting Electrochemical Corrosion.
5.4. Protective Measures Against Corrosion: Coating (Galvanic and Zinc, Organic Coating Coating Agents, Electroplating, Metal Cladding)
5.5 Concept of Alloy.

Section -2 (Organic Chemistry)

6. Organic Chemistry and Introduction to Polymers:

6.1 Types of Chemistry.
6.2 Catenation Property of Carbon.
6.3 Organic Compounds, Its Properties and Applications.
6.4 Classification of Organic Compound By Structure and Functional Group: Definne: Homologous Series, Alkanes, Alkenes and Alkynes; Properties And Uses of General Formula ; Names and Structure of First Five Members Hydrocarbons .
6.5 Polymer, Monomer, Classification of Polymers, Polymerization, Addition and Condensation Polymerization.
6.6 Plastics: Definition, Its Types and Uses.

Section -3 (Industrial Chemistry)

7. Glass and Ceramic:

7.1 Concept of Glass and Its Constituents, Classification and Uses of Different Glass, Elementary Idea of Manufacturing Process of Glass.
7.2 Introduction to Ceramic Materials, Its Constituent.
7.3 Industrial Application of Glass and Ceramic.
7.4 Industry Visit and Reporting.

8. Soap and Detergent:

8.1 Introduction - A. Lipid B. Fats and Oils
8.2 Saponification of Fats and Oils, Manufacturing Of Soap.
8.3 Synthetic Detergent, Types of Detergents and Its Manufacturing.
8.4 Exclusives: TNT, RDX, Dynamite.
8.5 Paint and Varnish
8.6 Adhesives.

9. Cement, Pulp And Papers:

9.1 Concept of Cement and Its Constituents, Classification and Uses of Different Cement, Manufacturing Process 0f Cement.
9.2 Manufacturing Process of Pulp and Papers.
9.3 Industry Visit and Reporting.

Section - 4 (Practical Chemistry)

1. Use Of Laboratory Tools And Safety Measures

2. Observation And Measurement :

2.1 Determine the Strength of Hcl Solution Using 0.1N Na_2CO_3

2.2 Determine The Strength of Naoh By Using 0.1N Hcl Solution.

3. Qualitative Analysis Of Known And Unknown Salts :

3.1 Identification of Known Salt (Sample Copper, Iron, Aluminum, Led, Ammonium and Zinc Salt.)

3.2 Identification of Unknown Basic Radical (E.G. Led, Copper, Iron, Zinc, Aluminum, Ammonium)

3.3 Identification of Unknown Acid Radicals (E.G. Chloride, Nitrate, Sulphate, Carbonate)

Source or Reference Book

1. Higher Secondary Chemistry (Paper 1st And 2nd)- Writer Dr.Gazi Md.Ahsanul Karim. And Md.Robiul Islam
2. Higher Secondary Chemistry (Paper 1st And 2nd)- Writer Dr.Soroz Kanti Singha Hazari .
3. An Introduction To Metallic Corrosion And Its Prevention- Writer Raj Narayan.
4. Organic Chemistry- Writer Morrisson And Boyad.
5. Inorganic Chemistry - Writer Ali Haider

65811 **SOCIAL SCIENCE** **T P C**
3 0 3

OBJECTIVE
To provide opportunity to acquire knowledge and understanding on :

- importance of civics and its relationship with other social sciences
- The relationship of an individual with other individuals in a society
- social organizations, state and government
- rule of law, public opinion and political parties
- UNO and its roles
- The basic concepts and principles of economics and human endeavor in the economic system.
- The realities of Bangladesh economy and the current problems confronting the country.
- The role of Diploma Engineers in industries.
- our motherland and its historical background
- good citizenship through practicing our socio- economic culture
- liberation war and its background
- nationalism and life style of the nation

SHORT DESCRIPTION
Civics and Social Sciences; Individual and Society; Nation and Nationality; Citizenship; state and government; Law; Constitution; Government and its organs; public Opinion; Political Party; UNO and its organs;
Scope and importance of Economics; Basic concepts of Economics- Utility, Wealth, Consumption, income wages, salary, value in use and savings; Production – meaning, nature, factors and laws; Demand and Supply; market equilibrium, national income, Current economic problems of Bangladesh; Role of Diploma Engineers in the economic development of Bangladesh; Occupations and career planning; Engineering teem.

Part-1 (Civics)

1. **Understand the meaning and scope of civics and inter relations of social sciences.**
   - 1.1 Define civics and social science.
   - 1.2 Explain the importance of civics in the personal and social life of an individual.
   - 1.3 Describe the relationship of all social science (civics, Economics, political science, Sociology, ethics)

2. **Understand the relationship of the individual with the society, Nationality and nation, Rights and duties of a citizen.**
   - 2.1 Define the concept (individual, society, socialization, Nation, Nationality, citizen and citizenship).
   - 2.2 State the relationship among the individuals in the society.
   - 2.3 Discuss the methods of acquiring citizenship and state the causes of losing citizenship
   - 2.4 Describe the rights of a citizen and state the need for developing good citizenship.

3. **Appreciate the relationship between the state and government, law and organs of government.**
   - **3.1** Meaning the state, government and law
   - 3.2 Discuss the elements of state.
   - 3.3 Discuss the classification of the forms of government
   - 3.4 Distinguish between cabinet form of Government and presidential form of government.
   - 3.5 Describe the main organs of Government (legislature, Executive and judiciary)
   - 3.6 Discuss the sources of law

4. Understand and the classification of constitution

4.1 Define the Constitution.
4.2 Explain the deferent form of Constitution
4.3 Explain state the salient feature of Bangladesh constitution.
4.4 Define the fundamental rights of Bangladesh constitution.
4.5 Meaning of human rights.

5. Understand the role of UNO in maintaining world peace

5.1 Explain the major functions of UNO.
5.2 State the composition and functions of General Assembly.
5.3 Describe the Composition and functions of Security Council.
6.4 Discuss the role of Bangladesh in the UNO.

6. Understand the role of Ethics values and good governance

6.1 Define the values, ethics and good governance.
6.2 Discuss the role of government to establish good governance

Part-2 (Economics)

1. Understand the fundamental concepts of economics.

1.1 Define the Microeconomics and Macroeconomics.
1.2 Discuss the definition of Economics as given by eminent economists.
1.3 Describe the importance of economics for Technical Student.
1.4 Define commodity, utility, value, wealth, consumption, income, savings, wages, value in use, value in exchange and salary.
1.5 Differentiate between value in use and value in exchange.
1.6 Explain wealth with its characteristics.

2. Understand the production process and the concept of the law of diminishing returns in the production process.

2.1 Discuss production mode and process
2.2 Explain the nature of different factors of production.
2.3 Discuss production function.
2.4 Discuss the law of diminishing returns.
2.5 State the application and limitations of the law of diminishing returns.
2.6 Describe the law of production (increasing constant and diminishing).

3. Understand the concept of demand, supply and utility.

3.1 Define the term, "demand and supply".
3.2 Explain the law of demand and supply .
3.3 Draw the demand and supply curve.
3.4 Discuss Market equilibrium.
3.5 Define the utility, total and marginal utility
3.6 Illustrate the law of diminishing utility.
3.7 Explain the law of diminishing marginal utility

4. Understand national income.

4.1 Define nation income.
4.2 Explain how to measure national income.
4.3 Discuss GNP, GDP and NNP.
4.4 Discuss economic development and growth

5. **Understand the current issues and the availability and use of natural resource in the economic development of Bangladesh**
    - 5.1 Define rural and urban economics.
    - 5.2 Identify major problems of rural and urban economy.
    - 5.3 Explain the migration of rural population to urban areas.
    - 5.4 List of the Natural resource of Bangladesh and classify them according to sources of availability.
    - 5.5 Explain the importance of the mine, forest and water resources and potential uses for sustainable development.

6. **Role of a Diploma Engineer in the Development of Bangladesh Economy.**
    - 6.1 Explain the concept of the term, "Engineering team"
    - 6.2 Identify the functions of Engineers, Diploma Engineers, craftsmen forming the engineering team.
    - 6.3 Discuss the role of a Diploma Engineer in the overall economic development of Bangladesh.
    - 6.4 Explain socio-economic status of a diploma Engineer.

Part-3 (Bangladesh: History& Culture)

সংক্ষিপ্ত বিবরণী

ইতিহাস

- ইতিহাসের সংজ্ঞা।
- বাংলাদেশের আবহাওয়া ও অধিবাসী।
- বাংলায় ইংরেজ শাসন ক্ষমতালাভ ও প্রতিষ্ঠা।
- ব্রিটিশ বিরোধী সশস্ত্র প্রতিরোধ আন্দোলন; সংস্কার আন্দোলন ও জাতীয়তাবাদেও বিকাশ এবং বাংলার নবজাগরণ; বঙ্গভঙ্গ ও বঙ্গভঙ্গ উত্তরকালে বাংলার রাজনীতি ও দেশ বিভাগ।
- পাকিস্তান আমলে বাংলাদেশ, বঙ্গবন্ধুর নেতৃত্বে বাংলাদেশের মুক্তি সংগ্রাম ও স্বাধীনতালাভ।

সংস্কৃতি

সংস্কৃতি, সভ্যতার সংজ্ঞা, সংস্কৃতির প্রকরণ, ভাষা আন্দোলন উত্তর বাংলার সংস্কৃতি, স্বাধীনতা উত্তর বাংলাদেশের সংস্কৃতির বিবর্তন, বাংলাদেশের সংস্কৃতিতে প্রত্নতাত্ত্বিক নিদর্শন ও ক্ষুদ্র নৃতাত্ত্বিক গোষ্ঠীসমূহ।

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রহিম, চৌধুরী, মাহমুদ ও ইসলাম, "বাংলাদেশের ইতিহাস (পরিবর্ধিত ও পরিমার্জিত)" ; নওরোজ কিতাবিস্তান, আগস্ট, ১৯৯৯।
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গোপাল হালদার; "সংস্কৃতির রূপান্তর"; মুক্তধারা, মে ১৯৮৪।
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