

BANGLADESH TECHNICAL EDUCATION BOARD

**4-YEAR DIPLOMA-IN-ENGINEERING
PROGRAM**

CIVIL TECHNOLOGY

SYLLABUS

THIRD SEMESTER

Civil Technology (64)

3rd 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	6431	Civil Engineering drawing (CAD)-1	1	6	3	10	40	50	50	150
2	6432	Surveying-1	2	6	4	20	80	50	50	200
3	6433	Structural Mechanics	3	3	4	30	120	25	25	200
4	5931	Mathematics- III	3	3	4	30	120	50	-	200
5	5913	Chemistry	3	3	4	30	120	25	25	200
6	5821	Social Science - II	2	0	2	20	80	-	-	100
7	5812	Physical Education and Life Skill Development	0	2	1	-	-	25	25	50
		Total	14	23	22	140	560	225	175	1100

6431 CIVIL ENGINEERING DRAWING (CAD)-I

T	P	C
1	6	3

AIMS

- To prepare the isometric drawing
- To prepare simple building drawing
- To assist to understand the code and symbols used in civil engineering drawing .
- To enable in learning detail drawing of building components.
- To enable to understand and perform computer aided design (AutoCAD).

SHORT DESCRIPTION

Isometric view, drawing of single storied building, Code and symbols used in drawing; Detail drawing of floor, spread foundation, wall, pile, road, doors & windows, truss, Computer Aided Design(CAD) and plotting.

DETAIL DESCRIPTION**Theory :****ISOMETRIC VIEWS**

- 1 Understand the basic principles of isometric view.**
 - 1.1 Define isometric view.
 - 1.2 Identify isometric scale.
 - 1.3 State the advantages of drawing isometric view.
 - 1.4 Differentiate orthographic views and isometric view.

DRAWING OF SINGLE STORID BUILDING WITH VERANDA

- 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.

CODE AND SYMBOLS

- 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 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.

DETAIL DRAWING

- 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 spread foundation.
- 4.4 List different types of RCC footing.
- 4.5 List different types of floors.

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 road

- 6.1 List different types of road
- 6.2 List different types of joints in rigid pavement
- 6.3 State the meaning of right of way.
- 6.4 Identify different components of a rigid pavement.
- 6.5 Identify different components of a flexible road.

7 Understand the features of doors and windows.

- 7.1 List different types of doors
- 7.2 Label different parts of doors.
- 7.3 List different types of windows.
- 7.4 Label different parts of windows.

8 Understand the features of trusses.

- 8.1 Define the term truss.
- 8.2 Label different parts of a wooden truss.
- 8.3 Label different parts of a steel truss.
- 8.4 Distinguish between king post and queen post truss.

COMPUTER AIDED DESIGN (CAD)

9 Understand the functions and uses of different CAD commands.

- 9.1 Define AutoCAD.
- 9.2 State how to start and exit AutoCAD.
- 9.3 Name different tools used in AutoCAD.
- 9.4 Explain the necessity of editing drawing.
- 9.5 State the necessity of drawing units and limits.
- 9.6 Mention the functions of the following editing commands:
copy, move, array, offset, trim, fillet, chamfer, extend, break,
rotate, stretch, mirror, change, scale and pedit.
- 9.7 State how to draw of the following draw commands:
line, triangles, rectangle, polygons, circles, arcs, etc.
- 9.8 Mention the functions of the following commands:
zoom, pan, undo, redo, save, etc.

- 9.9 Mention the functions of the following dimension commands:
dimension style, linear dimension, aligned dimension, etc.
- 9.10 State the insertion of text in drawing using AutoCAD.
- 9.11 Mention the functions of hatch in drawing using AutoCAD.
- 9.12 Mention the advantages of layers in drawing using AutoCAD.
- 9.13 Mention the functions of the following plotting commands:
layout, view port, model space, paper space.

Practical :

ISOMETRIC DRAWING

1 Prepare isometric drawing.

- 1.1 Draw the isometric view of rectangular and circular lamina.
- 1.2 Draw the isometric projection of solids such as cube, cylinder and steps from different orthographic views.
- 1.3 Translate the isometric views of different engineering components from orthographic views.
- 1.4 Translate the orthographic views of different engineering components from isometric views.

DRAWING OF SINGLE STORIED BUILDING WITH VERANDAH

2 Prepare drawing of a single storied building.

- 2.1 Draw the line plan of a single storied simple building with verandah.
- 2.2 Draw plan over plinth of simple building with verandah from the line plan as started in 2.1.
- 2.3 Draw front and side elevation of the simple building started in 2.2
- 2.4 Draw the cross section of simple building as started in 2.2
- 2.5 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.
- 2.6 Draw the isometric view of a given single roomed building showing front and one side elevation.

CODE AND SYMBOLS

3 Apply different types of code in civil engineering drawing.

- 3.1 Use the different types of design code.
- 3.2 Use clear cover for protection of reinforcing steel according to code.
- 3.3 Use anchorage of reinforcing steel according to code.
- 3.4 Use minimum thickness of structural members according to code.
- 3.5 Use minimum width of beam according to code.
- 3.6 Use minimum requirement of reinforcement according to code.

- 4 Apply different symbols in civil engineering drawing.**
- 4.1 Draw the standard hooks and bends according to code.
 - 4.2 Draw the compression joints in reinforcing steel.
 - 4.3 Draw the tensile joints in reinforcing steel.
 - 4.4 Prepare a bar-schedule with specification of reinforcing steel.
 - 4.5 Draw the construction, expansion & contraction joints.

DETAIL DRAWING

- 5 Construct the drawing of floor.**
- 5.1 Draw timber floor.
 - 5.2 Draw typical cement concrete (CC) floor over single brick flat soling.
 - 5.3 Draw the typical reinforced cement concrete (RCC) floor.
- 6 Prepare detail drawing of brick spread foundation and RCC footing.**
- 6.1 Draw the brick spread foundation for eccentric loading.
 - 6.2 Draw the brick spread foundation for soft soil.
 - 6.3 Draw the brick spread foundation on sloped ground.
 - 6.4 Draw the brick wall with RCC footing.
 - 6.5 Draw the RCC inverted T-beam footing.
 - 6.6 Draw the RCC cantilever footing.
- 7 Prepare the detail drawing of pile and pile cap.**
- 7.1 Draw the detail drawing of RCC cast-in-situ piles.
 - 7.2 Draw sections of a square pre-cast RCC pile.
 - 7.3 Draw the cross-section of a pile cap over a group of piles.
 - 7.4 Draw the shoe of a pile.
- 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 drawing of doors and windows (wooden/steel/aluminum).**
- 9.1 Draw the elevation of a paneled door.
 - 9.2 Draw horizontal section of paneled door cutting plane passing through panels.
 - 9.3 Draw vertical section of paneled door cutting plane passing through panels.
 - 9.4 Draw the horizontal cross-section and elevation of metal window.
 - 9.5 Draw the horizontal and vertical section of a fully glazed window.
- 10 Prepare detail (working) drawing of wooden truss.**
- 10.1 Draw elevation of king post/queen post roof truss on 25cm thick brick wall.
 - 10.2 Make detail (working) drawing of heel joint of wooden truss.
 - 10.3 Make detail (working) drawing of ridge of wooden truss.

- 10.4 Make detail (working) drawing of joint (intermediate point) of beam in wooden truss.

11 Prepare working drawing of steel truss.

- 11.1 Draw elevation of steel truss (pratt truss/warren truss) rests on 25cm x25cm RCC column.
 11.2 Make detail drawing of heel joint of steel truss rests on RCC column.
 11.3 Make detail drawing of ridge joint of steel truss.
 11.4 Make detail drawing of joint on the rafter of steel truss.
 11.5 Make detail drawing of joint on the tie beam of steel truss.

COMPUTER AIDED DESIGN (CAD)

12 Prepare geometrical drawing using AutoCAD.

- 12.1 Make a Auto CAD new file
 12.2 Set up the units, display formats and precision of measurements.
 12.3 Set up the drawing limits.
 12.4 Make a grid of dots similar to graph paper.

13 Draw and save drawing using AutoCAD.

- 13.1 Draw a line using Auto CAD.
 13.2 Draw triangles using Auto CAD.
 13.3 Draw different types of rectangles using Auto CAD.
 13.4 Draw different types of polygons using Auto CAD.
 13.5 Draw circles, arcs, etc using Auto CAD.
 13.6 Save the existing drawing using AutoCAD.

14 Edit the existing drawing using AutoCAD.

- 14.1 Erase a line using commands.
 14.2 Un erase an erased line using undo and redo commands.
 14.3 Magnify a portion of the drawing to look closely.
 14.4 Regenerate the whole drawing.
 14.5 Trim and extend a portion of a line, area, curve or any object.
 14.6 Move and copy a drawing from one place to another.
 14.7 Use commands to filled lines, areas and circles.
 14.8 Use commands to chamfer lines.
 14.9 Perform the uses of the following commands:
 array, offset, break, rotate, stretch, mirror, change, scale, pedit and explode.

15 Dimension a drawing using AutoCAD.

- 15.1 Select a drawing file for dimensioning.
 15.2 Use commands to add linear dimensions in the drawing.
 15.3 Use commands to add angular dimensions in the drawing.
 15.4 Use commands to modify dimension style in the drawing.

16 Layers and hatches the drawing using AutoCAD.

- 16.1 Create different layers for line, dimension, text, hatches, etc.
 16.2 Select different color for different layer.

- 16.3 Select the type and scale of the hatch for a drawing.
- 16.4 Select the type and size of the text for a drawing.
- 16.5 Insert text in the drawing.
- 16.6 Perform the uses of the following plotting commands:
layout, view port, model space, paper space.
- 17 Use text and plotting using AutoCAD.**
 - 17.1 Select the type and size of the text for a drawing.
 - 17.2 Insert text in the drawing.
 - 17.3 Perform the uses of the following plotting commands:
layout, view port, model space, paper space.
 - 17.3 Plot the drawing.
 - 17.4 Plot each layer of the drawing separately.
- 18 Prepare the drawing of plan, elevation and section of a single storied building.**
 - 18.1 Compose the data of plan for a single storied building using AutoCAD.
 - 18.2 Draw a plan of a single storied building using AutoCAD.
 - 18.3 Compose the data of elevation for a single storied building using AutoCAD.
 - 18.4 Draw the elevation of a single storied building using AutoCAD.
 - 18.5 Compose the data of section of a single storied building using AutoCAD.
 - 18.6 Draw the section of a single storied building using AutoCAD.

REFERENCE BOOKS

- | | |
|----------------------------------|------------------------------|
| 1. Structural Detailing | - Peter H Newton |
| 2. Civil Engg. Drawing | - Guru Charan Singh |
| 3. AutoCAD | - Engr. Md. Shah Alam |
| 4. Mastering AutoCAD 2008 | - Engr. Samuel Mallik |
| 5. Mastering AutoCAD | - George Omura |

Surveying- 1

Code: 6432

T	P	C
2	6	4

Objectives

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

1. Conduct the survey work with chain, 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:

INTRODUCTION TO SURVEYING

1.0 Understand 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.

CHAIN SURVEYING

2.0 Understand 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.

3.0 Understand 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.

4.0 Understand the 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.

5.0 Understand the 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.

6.0 Understand in 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.

7.0 Understand 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.

8.0 Understand 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.

9.0 Understand 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.

10.0 Prepare a 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.

11.0 Apply 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.

12.0 Understand 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.

13.0 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.

COMPASS SURVEYING

- 14.0 Understand 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.
- 15.0 Understand conversion of bearing.**
- 15.1 Explain fore 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.
- 16.0 Understand 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.

PLANE TABLE SURVEYING

- 17.0 Understand 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 Explain the functions of different instruments and accessories used in plane- table survey.
 - 17.4 Describe the procedure of setting up plane table.
 - 17.5 Explain the term orientation.
 - 17.6 Describe orientation by magnetic needle and back sighting.
 - 17.7 Name the methods of plane table survey.
 - 17.8 Describe radiation, intersection, traversing and resection methods.
- 18.0 Understand the methods of solving two points and three points' problem.**
- 18.1 Define two points problem.
 - 18.2 Describe the procedure of location of the plan the position of the instrument station of the ground by solving two points problem.
 - 18.3 Define three points problem.
 - 18.4 Describe the procedure of locating on the plan the position of the instrument station on the ground by solving three-points problem

19.0 Understand errors and precautions in plane table survey.

- 19.1 Describes the advantages and disadvantage of plane table survey.
- 19.2 List the error in plane table survey.
- 19.3 List the precautions to be taken in plane table survey.

CADASTRAL SURVEY**20.0 Understand the 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.

21.0 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. Surveying - 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.

6433**STRUCTURAL MECHANICS**

T	P	C
3	3	4

AIMS

- To enable to apply the knowledge of scientific principles to problems of a mechanical nature.
- To develop an understanding of mechanical properties of materials.
- To assist in applying mathematical and geometrical calculations to the analysis of statically determinate beams.

SHORT DESCRIPTION

Mechanical properties of materials; Work, power and energy; Laws of forces; Moment; Friction; Center of gravity; Moment of inertia; Torsion on circular shaft; Shear force and Bending moment.

DETAIL DESCRIPTION**Theory:****1. MECHANICAL PROPERTIES OF MATERIALS****1.0 Understand the important aspects of mechanical properties of materials.**

- 1.1 Explain the necessity to know about the mechanical properties of materials.
- 1.2 Define the following terms:
 - a. Stress, tensile stress, compressive stress, shear stress.
 - b. Strain, tensile strain, compressive strain, shear strain,
 - c. Hooke's law, modulus of elasticity and modulus of rigidity.
- 1.3 Explain stress-strain diagram of mild steel and concrete.
- 1.4 State the meaning of the followings:
 - a. Elasticity, proportional limit, yield point, ultimate stress, breaking stress, proof stress, working stress and factor of safety.
 - b. Strength, stiffness, toughness, ductility, malleability, brittleness, creep, fatigue failure, resilience, modulus of resilience, thermal stress in simple bar and poissons ratio.
- 1.5 Compute stress, strain, modulus of elasticity and modulus of rigidity.
- 1.6 Solve problems involving resilience, thermal stress and poissons ratio.
- 1.7 Compute stress develop in composite bar under tension and compression.

2. WORK, POWER AND ENERGY**2.0 Understand about the aspects of work, power and energy.**

- 2.1 Define the following terms:
 - a. work
 - b. power
 - c. energy
- 2.2 Specify the units of the followings:
 - a. work
 - b. power
 - c. energy
- 2.3 Describe work done in rotation and represent by area.

- 2.4 Mention the different kinds of energy.
- 2.5 Explain the relations of potential energy and kinetic energy.
- 2.6 Solve problems involving work, power and energy.

3. LAWS OF FORCES

3.0 Understand the concept of laws of forces.

- 3.1 Explain the laws of forces.
- 3.2 Define the following terms:
 - a. force; b. coplanar force; c. non-coplanar force; d. concurrent force; e. resultant force.
- 3.3 Mention the parallelogram laws of forces.
- 3.4 State the meaning of composition and resolution of forces.
- 3.5 Compute the resultant force of -
 - a. Triangle of forces
 - b. Polygon of forces
 - c. Converse law of triangle and polygon laws of forces graphically.
- 3.6 Explain Lami's theorem.
- 3.7 Solve problems on Lami's theorem.

4. MOMENT

4.0 Understand the aspects of moment of forces.

- 4.1 Define the term moment (analytically and graphically).
- 4.2 Differentiate moment with force.
- 4.3 Explain Varignon's principle of moment.
- 4.4 Distinguish like and unlike parallel forces.
- 4.5 State the meaning of couple.
- 4.6 Mention the properties of couple.
- 4.7 Solve problems on moment of couple.

5. FRICTION

5.0 Understand the concept of frictional forces.

- 5.1 State the meaning of friction and static & dynamic friction.
- 5.2 Mention the laws of static friction.
- 5.3 Explain angle of friction and co-efficient of friction.
- 5.4 Compute friction of a body on horizontal planes.
- 5.5 Compute friction of a body on inclined planes.
- 5.6 Compute frictional force acting on a ladder.

6. CENTER OF GRAVITY

6.0 Understand the aspects of center of gravity.

- 6.1 Explain the terms: centroid and center of gravity.
- 6.2 State the axis of symmetry.
- 6.3 Compute the center of gravity by the method of moment of the following sections:
 - a. rectangular
 - b. circular
 - c. semi-circular
 - d. hollow
 - e. I-shaped
 - f. T-shaped
 - g. L-shaped.

7. MOMENT OF INERTIA

7.0 Understand the concept of moment of inertia.

- 7.1 State 1st and 2nd moment of area.
- 7.2 Explain the meaning of radius of gyration.
- 7.3 Mention the theorems of moment of inertia.
- 7.4 Compute the moment of inertia of plane area about any axis of the following sections:
 - a. rectangular
 - b. circular
 - c. semi-circular
 - d. hollow
 - e. I-shaped
 - f. T-shaped
 - g. L-shaped.

8. TORSION ON CIRCULAR SHAFT

8.0 Understand the aspects of torsion on solid and hollow circular shaft.

- 8.1 State about the laws of motions.
- 8.2 Explain the term circular motion.
- 8.3 Define the terms: torsion and torsion stress.
- 8.4 Mention the assumptions of torsion stress.
- 8.5 Find the relation between torsion stress and strain.
- 8.6 Express the derivation of the formula for finding torque.
- 8.7 Determine the relations among torsion, horse power and velocity of shaft.
- 8.8 Solve problems involving torsion.

9. SHEAR FORCE AND BENDING MOMENT

9.0 Understand about the shear force (SF) and bending moment (BM).

- 9.1 Define the term beam.
- 9.2 List different kinds of beams.

- 9.3 State the meaning of load.
- 9.4 Mention various kinds of load on beams.
- 9.5 State the meaning of shear force and bending moment.
- 9.6 Differentiate between shear force and bending moment.
- 9.7 Mention the sign conventions of shear force and bending moment.
- 9.8 List the characteristics of shear force and bending moment diagram.
- 9.9 Draw SF and BM diagram of cantilever beams with point load, distributed load and both.
- 9.10 Draw SF and BM diagram of simply supported beams with point load, distributed load and both.

Practical:

1. Determine the compressive stress of a timber specimen.
2. Draw stress-strain curve of mild steel with test results.
3. Determine the hardness of mild steel plate.
4. Determine the stiffness of mild steel plate.
5. Determine the brittleness of cast iron.
6. Show the resultant of force by using the force board.
7. Prove the Lami's theorem by using the force board.
8. Determine the co-efficient of friction of timber, concrete and mild steel.
9. Determine reactions of a beam by using spring balance.

REFERENCE BOOKS

- | | |
|---------------------------|---|
| 1. Structural Mechanics | - W Morgan and D T Williams |
| 2. Structural Mechanics | - Singer / Popov |
| 3. Mechanics of Materials | - Philip Gustave Laurson and Williams Junkin Cox |
| 4. Structural Mechanics | - A. K. Upadhyay Published by SK Kateria & Sons, India. |

S.K Kataria & Sons

- 5 Applied Mechanics - A. K. Upadhyay

- Introduction
- Laws of Forces
- Moment
- Friction
- Centre of Gravity
- Moment of Inertia
- Laws of Motion
- Motion of Connected Bodies
- Circular Motion
- Simple Lifting Machines
- Laboratory Experiments

6 Structural Mechanics- A. K. Upadhyay

- Properties of Materials
- Stresses and strains
- Shear Force and Bending Moment
- Centre of Gravity
- Moment of Inertia
- Bending and Shear Stresses
- Slope and Deflection
- Column and Struts
- Combined Direct and Bending Stress
- Analysis of Trusses
- Experiments

5931 MATHEMATICS – III

T	P	C
3	3	4

AIMS

- To make understand the basic concept and techniques of composition and resolution of vectors and computing the resultant of vectors.
- 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 provide ability to apply the knowledge of differential calculus in solving problem like slope, gradient of a curve, velocity, acceleration, rate of flow of liquid etc.
- To enable to apply the process of integration in solving practical problems like calculation of area of a regular figure in two dimensions and volume of regular solids of different shapes.

SHORT DESCRIPTION

Vector	: Addition and subtraction, dot and cross product.
Co-ordinate Geometry	: Co-ordinates of a point, locus and its equation, straight lines, circles and conic.
Differential Calculus	: Function and limit of a function, differentiation with the help of limit, differentiation of functions, geometrical interpretation of $\frac{dy}{dx}$, successive differentiation and Leibnitz theorem, partial differentiation.
Integral Calculus	: Fundamental integrals, integration by substitutions, integration by parts, integration by partial fraction, definite integrals.

DETAIL DESCRIPTION**Vector****1 Apply the theorems of vector algebra.**

- 1.1 Define scalar and vector.
- 1.2 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.

- 1.3 Prove the laws of vector algebra.
- 1.4 Resolve a vector in space along three mutually perpendicular directions
- 1.5 solve problems involving addition and subtraction of vectors.

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

- 2.1 Define dot product and cross product of vectors.
- 2.2 Interpret dot product and cross product of vector geometrically.
- 2.3 Deduce the condition of parallelism and perpendicularity of two vectors.
- 2.4 Prove the distributive law of dot product and cross product of vector.
- 2.5 Explain the scalar triple product and vector triple product.
- 2.6 Solve problems involving dot product and cross product.

CO-ORDINATE GEOMETRY

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

- 3.1 Explain the co-ordinates of a point.
- 3.2 State different types of co-ordinates of a point.
- 3.3 Find the distance between two points (x_1, y_1) and (x_2, y_2) .
- 3.4 Find the co-ordinates of a point which divides the straight line joining two points in certain ratio.
- 3.5 Find the area of a triangle whose vertices are given.
- 3.6 Solve problems related to co-ordinates of points and distance formula.

4 Apply the concept of locus.

- 4.1 Define locus of a point.
- 4.2 Find the locus of a point.
- 4.3 Solve problems for finding locus of a point under certain conditions.

5 Apply the equation of straight lines in calculating various parameter.

- 5.1 Describe the equation $x=a$ and $y=b$ and slope of a straight line.
- 5.2 Find the slope of a straight line passing through two point (x_1, y_1) and (x_2, y_2) .
- 5.3 Find the equation of straight lines:
 - i) Point slope form.
 - ii) Slope intercept form.
 - iii) Two points form.
 - iv) Intercept form.
 - v) Perpendicular form.
- 5.4 Find the point of intersection of two given straight lines.
- 5.5 Find the angle between two given straight lines.

- 5.6 Find the condition of parallelism and perpendicularity of two given straight lines.
- 5.7 Find the distances of a point from a line.

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

- 6.1 Define circle, center and radius .
- 6.2 Find the equation of a circle in the form:
- $x^2 + y^2 = a^2$
 - $(x - h)^2 + (y - k)^2 = a^2$
 - $x^2 + y^2 + 2gx + 2fy + c = 0$
- 6.3 Find the equation of a circle described on the line joining (x_1, y_1) and (x_2, y_2) .
- 6.4 Define tangent and normal.
- 6.5 Find the condition that a straight line may touch a circle.
- 6.6 Find the equations of tangent and normal to a circle at any point.
- 6.7 Solve the problems related to equations of circle, tangent and normal.

7. Understand conic or conic sections.

- 7.1 Define conic, focus, directrix and eccentricity.
- 7.2 Find the equations of parabola, ellipse and hyperbola.
- 7.3 Solve problems related to parabola, ellipse and hyperbola.

DIFFERENTIAL CALCULUS

FUNCTION AND LIMIT

8. Understand the concept of functions and limits.

- 8.1 Define constant, variable, function, domain, range and continuity of a function.
- 8.2 Define limit of a function
- 8.3 Distinguish between $f(x)$ and $f(a)$.

8.4 Establish i) $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$

 ii) $\lim_{x \rightarrow 0} \frac{\tan x}{x} = 1.$

9. Understand differential co-efficient and differentiation.

- 9.1 Define differential co-efficient in the form of

$$\frac{dy}{dx} = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$h \rightarrow 0$$

- 9.2 Find the differential co-efficient of algebraic and trigonometrical functions from first principle.

10. Apply the concept of differentiation.

- 10.1 State the formulae for differentiation:

- i) sum or difference
- ii) product
- iii) quotient
- iv) function of function
- v) logarithmic function

Find the differential co-efficient using the sum or difference formula, product formula and quotient formula.

- 10.2 Find the differential co-efficient function of function and logarithmic function.

11. Apply the concept of geometrical meaning of $\frac{dy}{dx}$

- 11.1 Interpret $\frac{dy}{dx}$ geometrically.

- 11.2 Explain $\frac{dy}{dx}$ under different conditions

- 11.3 Solve the problems of the type:
A circular plate of metal expands by heat so that its radius increases at the rate of 0.01 cm per second. At what rate is the area increasing when the radius is 700 cm ?

12 Use Leibnitz's theorem to solve the problems of successive differentiation.

- 12.1 Find 2nd, 3rd and 4th derivatives of a function and hence find n-th derivatives.
- 12.2 Express Leibnitz's theorem
- 12.3 Solve the problems of successive differentiation and Leibnitz's theorem.

13 Understand partial differentiation.

- 13.1 Define partial derivatives.
- 13.2 State formula for total differential.
- 13.3 State formulae for partial differentiation of implicit function and homogenous function.
- 13.4 State Euler's theorem on homogeneous function.
- 13.5 Solve the problems of partial derivatives.

INTEGRAL CALCULUS

14 Apply fundamental indefinite integrals in solving problems.

- 14.1 Explain the concept of integration and constant of integration.

- 14.2 State fundamental and standard integrals.
- 14.3 Write down formulae for:
 - i) Integration of algebraic sum.
 - ii) Integration of the product of a constant and a function.
- 14.4 Integrate by method of substitution, integrate by parts and by partial fractions.
- 14.5 Solve problems of indefinite integration.

15 Apply the concept of definite integrals.

- 15.1 Explain definite integration.
- 15.2 Interpret geometrically the meaning of $\int_a^b f(x)dx$
- 15.3 Solve problems of the following types:
 - i) $\int_0^{\frac{\pi}{2}} \cos^2 x dx$
 - ii) $\int_0^1 \frac{(\sin^{-1} x)^2}{\sqrt{1-x^2}} dx$

P* = Practical continuous assessment

5913

CHEMISTRY

T	P	C
3	3	4

OBJECTIVES

- To provide the students a background of basic science required for understanding technology subjects.
- To develop a working knowledge of common engineering and industrial materials including physical and chemical properties and to enable to determine through experiments the properties of such materials.
- To develop a basic knowledge and concept of chemical reactions of common engineering and industrial materials.
- To develop through experiments the understanding of fundamental scientific concept which will provide a common base for further studies in science and technology.

SHORT DESCRIPTION

Role of Chemistry in the field of engineering and technology; Matter and its changes; Symbol, valency and chemical equations; Different types of chemical reactions; Catalyst and Catalysis; Acid, Base and Salt; Properties of gases; Dalton atomic theory; Avogadro's hypothesis; Laws of chemical equivalent; Atomic Mass and molecular mass; Atomic structure; Quantum numbers; Periodic table; Oxidation & Reduction; Chemical bond; Electrolytic conductance and electrolysis; Acid base equilibria; Water; Metals; Concept of Organic Chemistry; Aliphatic Hydrocarbon and Alcohols.

DETAIL DESCRIPTION**Theory :MATTER AND ITS CHANGES****1 Symbol, Valency & Chemical Equation**

- 1.1 Define matter, element, compound, mixtures, solutions and suspensions.
- 1.2 Distinguish between, " atoms and molecules", "physical change and chemical change", "exothermic and endothermic changes and reactions".
- 1.3 Identify exothermic and endothermic reactions from a given list of reactions.
- 1.4 Define symbol and formula, valency of elements and radicals.
- 1.5 Discuss the variations of valency with examples.
- 1.6 Define active and latent valency.
- 1.7 Define chemical equation .
- 1.8 Explain the full meaning of a given chemical equation.

DIFFERENT TYPES OF CHEMICAL REACTIONS , CATALIST & CATALYSIS**2 Understand the concept of chemical reactions.**

- 2.1 Define chemical reaction.
- 2.2 Name the methods of bringing about chemical reaction.
- 2.3 Give examples of different types of chemical reactions with suitable examples.
- 2.4 Define catalysis and catalyst.
- 2.5 Mention different types of catalyst with examples.

- 2.6 List five uses of catalysts in industries.

ACID, BASE & SALT

3 Understand acid, base and salt.

- 3.1 Define acid, base and salt.
 3.2 List five properties of acid, base and salt.
 3.3 Classify salts according to their chemical properties.
 3.4 Explain basicity of an acid and acidity of a base.

STATES OF MATTER

4 Understand properties of gases.

- 4.1 Identify the basic properties of gases.
 4.2 Define Boyle's law & Charles' law, absolute temperature S.T. P /N.T.P
 4.3 Deduce the relationship between pressure, volume and temperature of a gas to establish Boyle's Law, Charles' law and the law of pressure.
 4.4 Combine the gas laws to establish the gas equation.
 4.5 Establish the partial pressure of mixed gases using Dalton's law of partial pressure.
 4.6 Solve problems in relation to pressure, volume, temperature and partial pressure of a mixture of gases.

DALTON'S ATOMIC THEORY & AVOGADRO'S HYPOTHESIS

5 Understand Dalton's atomic theory & Avogadro's hypothesis

- 5.1 List the four postulates of Dalton's atomic theory.
 5.2 Explain at least five limitations of Dalton's atomic theory.
 5.3 State Avogadro's hypothesis.
 5.4 Explain Avogadro's constant.
 5.5 Explain five applications of Avogadro's hypothesis in Chemistry.
 5.6 Solve problems using the knowledge of Avogadro's hypothesis.

6 Understand chemical equivalent, Atomic & molecular Mass.

- 6.1 Define the chemical equivalent of an element, a compound, a radical, an acid an alkali and a salt.
 6.2 Explain the variations in chemical equivalent of an element.
 6.3 Define atomic mass and molecular Mass.
 6.4 Establish a relationship among chemical equivalent, valency and atomic Mass.
 6.5 Solve problems to find out atomic Mass, chemical equivalent and valency.

7 Understand the modern concept of atomic structure.

- 7.1 State the fundamental particles of atom.
 7.2 Explain the following terms:
 i) Atomic number ii) Isotopes iii) Isobar iv) Gram-atom
 v) Mass Number and vi) Gram molecular Mass, vii) Mole viii) ISO tone.
 7.3 Describe Rutherford's and Bohr's atomic model.

8 Understand the quantum numbers.

- 8.1 Define quantum numbers .
 8.2 Explain the significance of the following quantum numbers:
 i) Principal quantum number

- ii) Subsidiary quantum number
 - iii) Magnetic quantum number
 - iv) Spin quantum number
- 8.3 Explain the Pauli's exclusion principle.
- 8.4 Explain the probability distribution of electrons round the nucleus.
- 8.5 Define orbit and orbital.
- 9 Understand the modern periodic table.**
 - 9.1 State the periodic law of elements.
 - 9.2 Describe the modern long periodic table.
 - 9.3 Explain the limitations of periodic table.
 - 9.4 Give the Name of IA, VII-A and Zero group elements.
- 10 Understand oxidation and reduction.**
 - 10.1 Explain the modern concepts of oxidation and reduction with examples.
 - 10.2 Explain "oxidizing agent" and "reducing agents" with examples.
 - 10.3 Explain the oxidation and reduction takes place simultaneously.
 - 10.4 Explain the oxidation number and oxidation state.
 - 10.5 Write the oxidation number of an element from its compounds.
- 11 Understand the modern concept of chemical bonds.**
 - 11.1 Define chemical bond.
 - 11.2 List the different types of bonds.
 - 11.3 Explain the modern concept of ionic bonds.
 - 11.4 Explain the co-valent bonds, co-ordinate bond, Sigma bond, Pie bond.
- 12 Understand the fundamentals of electrolysis.**
 - 12.1 Define electrolysis.
 - 12.2 Differentiate between electrical conductor and electrolyte.
 - 12.3 Explain the process of electrolysis.
 - 12.4 Explain Faraday's laws of electrolysis.
 - 12.5 List at least four Industrial applications of electrolysis.
- 13 Understand pH value, Acidimetry and Alkalimetry.**
 - 13.1 Define pH, acidimetry and alkalimetry.
 - 13.2 Explain pH scale and its uses.
 - 13.3 Explain acid base titration.
 - 13.4 Explain the method of preparation of normal solutions.
 - 13.5 Define of indicators and their uses.
 - 13.6 Explain buffer solutions and their working mechanism.
- 14 Understand oxides and hydroxides.**
 - 14.1 Define oxide and hydroxide.
 - 14.2 Describe the classification of oxides and hydroxides.
 - 14.3 Explain different types of oxides and hydroxides with examples.
- 15 Understand the chemical process involved in water treatment.**
 - 15.1 Distinguish between hard water and soft water.
 - 15.2 Differentiate between temporary and permanent hardness of water.
 - 15.3 List at least three disadvantages and three advantages of using hard water.

- 15.4 Describe the Permutit process of softening hard water by explaining the reactions that take place.
- 15.5 Explain the ion exchange resin process of softening water.
- 15.6 Describe chemical tests of water.
- 16 Understand the extraction and refining process for Iron, Copper, Zinc and Aluminum.**
 - 16.1 Compare the properties of metal and non-metal.
 - 16.2 Define (i) ores (ii) roasting (iii) calcination (iv) smelting (v) alloy (vi) slag, (vii) Flux.
 - 16.3 Give names and formulae of important ores of Iron, Copper, Aluminum and Zinc.
 - 16.4 Describe the manufacturing process of iron and copper from its ore.
 - 16.5 Compare the properties of (i) Cast Iron (ii) iron (iii) Steel (iv) Wrought Iron.
- 17 Understand the concept of Organic Chemistry and organic compounds.**
 - 17.1 Define Organic Chemistry.
 - 17.2 Distinguish between organic and inorganic compounds.
 - 17.3 Explain homologous series of organic compounds.
 - 17.4 List the molecular and structural formulae of methane, ethane, propane and butane.
 - 17.5 Explain functional groups of organic compounds.
- 18 Understand the aliphatic hydrocarbons and the alcohols.**
 - 18.1 Define hydrocarbon, saturated and unsaturated hydrocarbons.
 - 18.2 Define alkane, alkene and alkynes.
 - 18.3 Explain common system, derived system and IUPAC system of nomenclature of organic compounds.
 - 18.4 Define Alcohols.
 - 18.5 Explain the classification of alcohol.
 - 18.6 Define the term Enzyme, Fermentation, De-carboxylation, Power Alcohol, Absolute Alcohol.

PRACTICAL :

OBSERVATION AND MEASUREMENT

1. Measure the pH value of unknown solutions to classify them as neutral, acidic or alkalis.
2. Prepare a decinormal solution of sodium carbonate.
3. Determine the unknown strength of an acid. Solve by a standard alkalis solution with a suitable indicator.

QUALITATIVE ANALYSIS OF KNOWN SALTS

4. Perform test tube tests for the known salt samples Copper salt, Iron salt, Lead salt, Aluminum salt, Ammonium salt, etc.
5. Perform charcoal oxidation and reduction test for the different salt e.g. such as Lead salt, Copper salt, Iron salt, Calcium salt, etc.
6. Perform tests to detect unknown basic radicals e.g. Lead, Copper, Iron Calcium, Zinc, Aluminium, Ammonium and Sodium.
7. Perform tests to detect unknown acid radicals e.g. chloride, nitrate, carbonate and sulphate

5821	SOCIAL SCIENCE – II (BANGLADESH : HISTORY & CULTURE)	T	P	C
		2	0	2

উদ্দেশ্য

- cÜv-tgNbv-hgbv eÜxc Aajv Z tftMvj K AÄtj ev½vj x mgvR Mvb Ges bvbv HwZnmK weZfb chfç tci tq MwZ AvaybK evsj vt`k m=utK@wk¶v_¶ i h_v_¶AeMZ Kivbv Ges Zvt`i mwVK teva mvoKiY|
- cÜKwZK I A_¶wZK Kivvgti cwi gÜtj evsj vt`tki ms`wZK weKviki mvt_ wk¶v_¶ i D½wZ Kti evsj vt`tki thvM` I cwi kwj Z bvMwi K wmvte h_v_¶eKwZKiY|

সংক্ষিপ্ত বিবরণী

ইতিহাস

- BwZnvmti msÁv|
- evsj vt`tki Avenl qv I Anaevm|
- cÜwZnmK I cÜPxbKvtj evsj vt`k |
- evsj vq gmv gvb` i AvMgb, cÜZöj vf I kimb – Lj Rx I ZK¶kmtb evsj vq `faxb mj Zvbx cÜZö; evsj vt`tki kvnx Avgj, AvdMvb I tgvNj Avgtj evsj vi kimb|
- evsj vq BDti vxcq ewYKt` i AvMgb; bevex Avgtj evsj vi kimb e`v; evsj vq Bsti R kimb ¶gZv j vf I cÜZö|
- weÜK weÜvax mk`cÜZti va Avb`vj b; ms`vi Avb`vj b I RvZxqZvev` i weKvk Ges evsj vi beRvMiY; e½f½ I e½f½ DEiKvtj evsj vi ivRbmZ I t`k wefvM|
- cwK`f vb Avgtj evsj vt`k Ges evsj vt`tki g½ msMüg I h½|

সংস্কৃতি

ms`wZi msÁv, Aw h½M evsj vi mgvR-ms`wZi ifçtiLv, mj Zvbx, tgvNj I bevex Avgtj i evsj vi mgvR ms`wZ; Bsti R Avgtj evsj vi mgvR I ms`wZ|
ie`a I bRi`j h½ Ges ie`a I bRi`j DEi evsj vi mgvR I ms`wZ; cwK`f vb Avgtj evsj vt`tki ms`wZK ifçtiLv; `faxbZvDEi evsj vt`tki ms`wZ|

বিশদ বিবরণী

BwZnm

১. ইতিহাসের সংজ্ঞা, প্রাগৈতিহাসিক আমলের বাংলাদেশ এবং বাংলাদেশের আবহাওয়া ও অধিবাসী সম্পর্কে অবগত হওয়া।

- 1.1 BwZnvmti msÁv cÜvb|
- 1.2 evsj vt`tki cÜPxb Rbc` Dtj LKiv|
- 1.3 e½ ev evsj v bvtgi DrwE e`vLv Kiv|
- 1.4 et½i mvgvti Lv wPvyZ Kiv|
- 1.5 evsj vi Avenl qv I Gi Anaevmt` i Pwi t` Avenl qvi cÜve weZ Kiv|
- 1.6 cÜwZnmK I cÜPxb evsj vi Av_mvgvRK e`v eYbv Kiv|

২. বাংলাদেশে গুপ্ত, রাজা শশাঙ্ক, পাল ও মুসলিম শাসন সম্পর্কে অবগত হওয়া।

- 2.1 B kimb Avgtj evsj vi kimb e`v eYbv Kiv|

- 2.2 ivRv kkvf% i ivR` weRq I kmb eYbv Kiv|
 2.3 evsj vi AivRKZv I mDtbmvs Gi Avgtj evsj vi Ae`v eYbv Kiv|
 2.4 tMicyj KZK AivRKZv Aemvb Nvrbvi KuztZi eYbv Kiv|
 2.5 evsj vt` tk gmj gvbti i AvMgb I eLwZqvi Lj Rxi evsj v weRq eYbv Kiv|
 2.6 evsj vt` tk `vaxb mj Zvbx kmb cŁZov kvqOvi b Buj qvk kvTxi KuzZjeYbv Kiv|
 2.7 evsj vq tgvNj kmtbi BuzE e`vL`v Kiv|
 2.8 1757 mvtj i cj vkxi ht`xi KviY, Nubv I djvdj eYbv Kiv|

৩. পলাশীযুদ্ধ পরবর্তী অবস্থায় ইস্ট ইন্ডিয়া কোম্পানীর আধিপত্য বিস্তার সম্পর্কে জ্ঞাত হওয়া।

- 3.1 t`l qvbx, %Zkmb I evsj vi `rfi eYbv Kiv|
 3.2 BstIRti i mPi`vqx eph`ve`f Ges Gi djvdj eYbv Kiv|
 3.3 evsj vt` tk Rvg`vi, cRve`e`v cŁZov Ges Av`mvgmRK e`e`vq Rvg`viti i fvgKv I cRvKtj i mveR Ae`v Dti eKiv|
 3.4 1905 mvtj i e%fv Avb`vj b I djvdj e`vL`v Kiv|
 3.5 nvrX kixqZ Dj m divtqRv Avb`vj b I Gi djvdj e`vL`v Kiv|

৪. বঙ্গভঙ্গউত্তর রাজনীতি ও দেশ বিভাগ সম্পর্কে অবহিত হওয়া।

- 4.1 1937 Gi mbePb I Gi `enkó` Dti eKiv|
 4.2 jvtrvi cT`ve e`v Kiv|
 4.3 1943 Gi evsj vi `rfi i KviY I Gi cefci Ae`v Dti eKiv|
 4.4 cmK`fvtbi cefAj mmtvte 1947 mvtj ce`cmK`fvtbi cŁZov e`vL`v Kiv|

৫. পাকিস্তান আমলে বাংলাদেশের (তৎকালীন পূর্ব পাকিস্তান) রাজনীতি, অর্থনীতি ও সামাজিক অবস্থা সম্পর্কে অবগত হওয়া।

- 5.1 fvlv Avb`vj b I mgKvjxb ivR%wZK I mvgmRK tcmZ e`v Kiv|
 5.2 Avl qvgjx m cŁZov, h% dU I 21`dv`vexi mfiEzZ mbePb Abpib Ges h% dU i gmsfiv MvB I emZj Avtj vPbv Kiv|
 5.3 cmK`fvtbi mvgm K Afzlv, AvBqe mvtivax Avb`vj b I 6`dv`vex, AvMiZjv lohSjgvgj vi BuzE eYbv Kiv Ges ce`cmDg cmK`fvtbi A`wZK`el`tg`i LwZqv Dti eKiv|
 5.4 1969 mvtj i MYAfzlv Ges Gi avivemKZvq evsj vt`tki g%h% I `vaxb mveffSg evsj vt`k cŁZov Kivi cUfvg I Nubv cDvn eYbv Kiv|
 5.5 1971 mvtj i HuznmK g%h% Ges `vaxb mveffSg evsj vt`tki Afzlv eYbv Kiv|

৬. স্বাধীন সার্বভৌম বাংলাদেশের রাজনীতি ও আর্থ-সামাজিক অবস্থা সম্পর্কে অবগত হওয়া।

- 6.1 ht`xviEi `vaxb mveffSg evsj vt`tki Av`mvgmRK cpmvB KgZrciZv eYbv Kiv|
 6.2 1973 mvtj i mbePb Ges 1974 mvtj msueavtbi 4`mstkvabxi gra`tg miKvi c`wZi cmi eZB e`v Kiv|
 6.3 1975 mvtj i 15 AvM÷ RmZi RbK e%eUz tkL gvRej ingvb -Gi kinv`vZ eiY Ges ivR%wZK cUcmi eZB|
 6.4 1981 mvtj ivócmZ mRqvDi ingvbtbi kinv`vZ eiY, 1982 mvtj i mvgm K Afzlv Ges ivR%wZK cUfvg cmi eZB|
 6.5 1990 mvtj Gikv` miKvti i cZb Ges ZE`earqK miKvi c`wZ AbjnstM 1991 mvti mbePb Ges MYZmšK Abkxj tbi mPbv|

সংস্কৃতি

৭. সংস্কৃতির সংজ্ঞা এবং প্রাচীন ও মধ্যযুগীয় বাংলার সংস্কৃতি ও সাহিত্য চর্চা সম্পর্কে অবগত হওয়া।

- 7.1 ms`wZi msAv`vb|

- 7.2 cİPxb evsjvi fvlv mwnZ" I ms"Zi ifctiLv eYBv Kiv|
 7.3 evl½j x ms"Z wbgfY gumfiv I cİ_ mwnZ"i cİfve eYBv Kiv|

৮. আধুনিক যুগে বাংলাদেশের সংস্কৃতি ও বাংলাভাষার আধুনিক রূপলাভ সম্পর্কে অবগত হওয়া।

- 8.1 BstİR kimb Avgtj mvgwRK Kms"wi`ixKiİY (m"vi`mq`Avg`, `mq`Avgxi Avj x I ivRv ivgtgrnb
 ivq) Gi Awefİe Ges Zvİ`i KgZrciZv e"vL"v Kiv|
 8.2 K"wi mİfne Ges tcvU"DBİj qvg Ktj R/ms"Z Ktj R`vctbi gvaİtg evsjvi bZb ms"Zi ifcjvf eYBv
 Kiv|
 8.3 BstİRİ`i wk"İvbxmZ cİZB e"vL"v Kiv Ges Kİj KİZv wekİe`İj q I Bmj wgvv grİmv`vctbi gvaİtg evsjvi
 ms"Zi weKİk e"³ Kiv |
 8.4 XİKv wekİe`İj q cİZövi BİZeİ e"vL"v Kiv|

৯. ১৯৪৭ এর দেশ বিভাগ ও সাংস্কৃতিক অবস্থার পরিবর্তন সম্পর্কে অবগত হওয়া।

- 9.1 ZrKİjxb ce"cmK`İvİbi Zgİİp gRİjİmi fİgKv Dİj İ-Kiv|
 9.2 1952 mİtj i fvlv Avİ`İj İbi mvs"ZK İ"Zİ Dİj İ-Kiv|
 9.3 XİKv İKİw`K wkİ x-mwnmZ"Kİ`i evsİmİj x ms"Z wbgfYi fİgKv cvj b Dİj İ-Kiv|
 9.4 İb9 Gi MY Avİ`İj İbi mvs"ZK Kgİİ`i fİgKv Dİj İ-Kiv|
 9.5 evİj v GKİvWgİ cİZövi Ges evsj v fvlv I mwnZ" Gi fİgKv Dİj İ-Kiv|
 9.6 Avİİ RİZK gvZ.fvlv İ`em İntİte 21 tde"qwi i Zvrch"e"³ Kiv|
 9.7 fvlv, wkİ mwnZ" PPİq msev`cİ I Bİj KUIbK wgvWqvi fİgKv Dİj İ-Kiv|

১০. সংস্কৃতির উপর গ্রামীণ অর্থনীতির প্রভাব অবগত হওয়া।

- 10.1 ZuZ wkİ I gmİj b Drcv`İbi BİZeİ e"vL"v Kiv|
 10.2 cvU Pİİli A_İZK cİfve e"³ Kiv|
 10.3 evl½j x ms"Zi Ask İntİte`İ»RvZ wgvbİmvgMİi (wgvó, gvLb, `İa, İcVİv-cİj cİfİZ) cİfve e"³
 Kiv|
 10.4 İ`kİq İgj v I cveİbi mvs"ZK İ"Zİ e"vL"v Kiv|
 10.5 MİgxY İckİvRİeİ`i (Kİgvi, Kgvi, ZuZx, İRİj, QZİv, BZİw) mvs"ZK İ"Zİ e"vL"v Kiv|

11. evsj İİ`İki ms"ZİZ Awİ emx ms"Z I cİZeZİEİK İb`kİbi Ae`İb mİİİK"İeMİZ nİ qv|

- 11.1 evsj İİ`İki Awİ emx mİİİK"İDİj İ-Kiv|
 11.2 evsj İİ`İki ms"ZİZ Mİİov, İvLİBb, mvl Zİj, PİKgİv Awİ emİİ`i ms"ZK Ae`İb e"vL"v Kiv|
 11.3 evsj İİ`İki cİPİb ms"Zİ HİZİn" İmİte grv`İbMo, gqİvİgİZ I cİvİocİİ cİZeZİEİK İb`kİbi eYBv
 `İb|

সহায়ক পুস্তক

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5812 PHYSICAL EDUCATION AND LIFE SKILL DEVELOPMENT

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OBJECTIVES

- To enhance body fitness.
- To make aware of first aid procedure.
- To acquaint with the common games and sports.
- To develop life skill

SHORT DESCRIPTION

Warming up; Yoga; Muscle developing with equipment; First aid; Games & sports; life skill development.

DETAIL DESCRIPTION**1. National Anthem and Assembly**

- 1.1 Make assembly
- 1.2 Recitation of national anthem
- 1.3 National anthem in music

2. Warming up

- 1.1 General Warming-up :
Head rotation, Hand rotation, Side twisting, Toe touching, Hip rotation, Keen twisting, Ankle twisting, Push up & Sit up.
- 1.2 Squad Drill :
Line, File, Attention, Stand at easy, Stand easy, Left turn, Right turn, About turn, Mark time, Quick march, Right wheel, Left wheel, Open order march & Closed order march.
- 1.3 Specific warming up :
Legs raising one by one, Legs raising in slanting position, Knee bending and nose touching, Heels raising, Toes touching & Laying position.
- 1.4 Mass Physical Exercise (Free hand) :
Hand raising, Side twisting, Front & back bending, Front curl, Straight arms curl two hands, Hands raising overhead and Push up & Push down.

3. Yoga

- 3.1 Dhyanasan : Shabasan, Padmasan, Gomukhasan, Sharbangasan, Shirshsan
- 3.2 Shasthyasan : Halasan, Matshasan, Paban Muktasana, Ustrasana

4. Muscle Developing with equipment

- 4.1 Damball : Front curl, Hand sidewise stretching, Arms raising overhead.
- 4.2 Barball : Front press, Leg press, Rowing motion with leverage bar.
- 4.3 Rope climbing : Straight way climbing, Leg raising climbing.
- 4.3 Horizontal bar : Chinning the bar front grip, Chinning the bar wide back grip.
- 4.4 Jogging Machine : Slow, medium, and fast running
- 4.5 Rowing Machine :

5. Show skill on conversation on day to day life

- 5.1 Today's Market price
- 5.2 Festivals(religious festivals, National festivals)
- 5.3 Celebration of National days
- 5.4 Aim of life
- 5.5 Visited historical places/sites
- 6. Human relation**
 - 6.1 Family relation
 - 6.2 Relation with neighbor
 - 6.3 Humanitarian Service
 - 6.4 Service for handicapped (intelligent, physical, social etc.)
 - 6.5 Service for orphan / Patient
- 7. Vote of appreciation**
 - 7.1 About dress
 - 7.2 For good work
 - 7.3 For good result
 - 7.4 For good news
- 8. Telephone conversation**
 - 8.1 Use of telephone
 - 8.2 Courtesy for using telephone
 - 8.3 Receiving and sending messages through telephone
 - 8.4 Presenting the gist
- 9. Stress Management**
 - 9.1 Habit to be a man of humor
 - 9.2 Positive thinking
 - 9.3 Habit to changing thinking
- 10. Time Management**
 - 10.1 Determine essential time for a task
 - 10.2 Determine delay and unexpected time
 - 10.3 Determine time for daily activities
 - 10.4 Plan for daily activities
- 11. Interview Technique**
 - 11.1 Mental preparation to face an interview
 - 11.2 Selection of dress for interview
 - 11.3 Introducing himself/herself to the interviewer
 - 11.4 Coping interview
- 12. Team work**
 - 12.1 Organized a team
 - 12.2 Selection of team leader
 - 12.3 Distribution to the task to the members
 - 12.4 Accepting opinion of team members
 - 12.5 Completion of task as a team
- 13. Social work**
 - 13.1 Tree plantation
 - 13.2 Community service (Sanitation, pure drinking water, social culture etc.)