BANGLADESH TECHNICAL EDUCATION BOARD
Agargoan, Dhaka-1207.

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

CONSTRUCTION TECHNOLOGY

TECHNOLOGY CODE: **688**

3rd SEMESTER

DIPLOMA IN ENGINEERING
PROBIDHAN-2016

CONSTRUCTION TECHNOLOGY (688)

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	68831	Construction Engineering Drawing -1	1	3	2	20	30	25	25	100
2	68832	Construction Surveying -1	3	3	4	60	90	25	25	200
3	68834	Construction Methodology-1	3	3	4	60	90	25	25	200
4	68833	Construction Safety Practices	1	3	2	20	30	25	25	100
5	65931	Mathematics-3	3	3	4	60	90	50	0	200
6	65913	Chemistry	3	3	4	60	90	25	25	200
7	65812	Physical Education & life Skill development	0	3	1	0	0	25	25	50
Total			**14**	**21**	**21**	**280**	**420**	**200**	**150**	**1050**

68831 Construction Engineering Drawing-I

T P C

1 3 2

AIMS:

To provide knowledge, skill and attitude in the area of drawing with special emphasis on:

- preparation of isometric drawing.
- understanding section and sectional views.
- developing of plan, elevation and section of building.
- acquaint the students with the knowledge of building components such as column, beam, slab, stair, footing.

SHORT DESCRIPTION:

Isometric view; section and sectional view; plan, elevation and section of a single storied building with verandah; plan, elevation and section of a semi-permanent building; cross-sectional view of building components such as column, beam, slab, footing, stair etc.

DETAIL DESCRIPTION:

Theory:

1. Understand isometric views.

1.1: Define view and isometric view.
1.2: Identify isometric scale.
1.3: State the advantages of drawing isometric views.

2. Understand section and sectional views

2.1: State the meaning of sectional views.
2.2: Describe section and sectional views.
2.3: Define cutting plane.
2.4: Explain the necessity of sectional views.
2.5: Define half and full section.
2.6: Describe half and full section.

3. Understand plan, elevation and section of single storied building with verandah

3.1: Define line plan of a building.
3.2: Explain the necessity of drawing plan, line plan, floor plan, elevation and section of a building.
3.3: Explain the procedure of planning.

4. Understand plan, elevation and section of semi-permanent building

4.1: Define semi-permanent building.
4.2: State different parts of semi-permanent building.
4.3: Classify truss for semi-permanent building.

5. Understand cross sectional views of building components.

5.1: Define various building components.

5.2: Identify different components of a building from a sectional view.
5.3: Procedure of drawing section of column, beam, footing, slab, stair.

Practical:

1. Practice to draw an object in isometric view.

1.1: Draw the isometric view of rectangular and circular lamia in isometric view.
1.2: Draw the isometric projection of solids.

2. Perform section and sectional views

2.1: Draw standard symbols of materials and rules for sectioning.
2.2: Draw different type of sectional views.

3. Make plan, elevation and section of single storied building with verandah

3.1: Draw the different parts of a building.
3.2: Draw the line plan of a single storied simple building with verandah.
3.3: Draw plan over plinth of a simple building with verandah from line plan as stated in 3.2.
3.4: Draw front and side elevation of the simple building as stated In 3.2.
3.5: Draw cross section of a simple building as stated in 3.3.
3.6: Draw half elevation and half section of simple building as stated in 3.3.
3.7: Draw the site plan and layout plan of a simple building as stated in 3.3.
3.8: Draw the isometric view of a given single roomed building showing front and one side elevation.

4. Prepare plan, elevation and section of semi-permanent building

4.1: Draw the line plan of a simple semi- Permanent building with verandah
4.2: Draw the plan over plinth of a semi permanent Building.
4.3: Draw the front and side elevation of the semi- permanent building stated in 4.2.
4.4: Draw different parts of king and queen post truss.
4.5: Assemble plan over plinth, elevation and section of semi-permanent building with proper dimension, heading, title block in proper place in one sheet according to given data.

5. Prepare cross sectional views of building components.

5.1: Draw the plan and section of different types of column.
5.2: Draw the plan and section of different types of beam.
5.3: Draw the plan and section of different types of footing.
5.4: Draw the plan and section of different types of slab.
5.5: Draw the plan and section of different types of stair.

REFERENCE BOOKS

1. Engineering Drawing
   - R.B. Gupta
2. Civil Engineering Drawing
   - Guru Charan Singh

68832 CONSTRUCTION SURVEYING − I

T	P	C
3	3	4

AIMS

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

- survey work with chain, compass and plane table.
- conduct cadastral survey.
- conduct leveling and contouring
- calculate of the area by using simple instrument.

SHORT DESCRIPTION

concept of surveying; Chain surveying; Compass surveying; Plane table surveying; Cadastral surveying; Leveling and Contouring.

DETAIL DESCRIPTION

Theory:

1 Understand the concept of surveying

1.1 Define surveying.
1.2 State the purpose of surveying.
1.3 Discuss the classification of surveying based on shape of the earth, nature of field, objective of surveying and instrument employed.
1.4 Explain field work.
1.5 Explain office work.
1.6 Identify survey instruments with their care and adjustment.
1.7 Differentiate between plane survey and geodetic survey.

2 Understand the basic principle of chain surveying.

2.1 Define the meaning of chain surveying.
2.2 Explain chain line, base line, tie line, check line and station points ill-conditioned and well conditioned triangle.
2.3 List the equipment and accessories used in chain surveying.
2.4 Mention the use of arrows, ranging rod, offset rod, cross-staff, prism square, box-sextant and clinometers.
2.5 Explain the construction and use of optical square.
2.6 Define direct and indirect ranging.
2.7 Describe the procedure of indirect ranging (reciprocal ranging) on sloping ground.
2.8 Describe the procedure of measuring linear distances with the help of chain and tape.
2.9 Define single line and double line field book.
2.10 Describe the procedure of booking in a single line field book.
2.11 Describe the procedure of booking in a double line field book.

3 Understand chaining across obstacles.

3.1 Define obstacles of chain surveying.
3.2 Describe the procedure of chaining across obstacles when the chaining free-vision obstructed.
3.3 Describe the procedure of chaining across obstacles when the vision free-chaining obstructed.
3.4 Describe the procedure of chaining across obstacles when both chaining and vision

obstructed.

4 Understand the errors in chaining.

4.1 List the errors in chaining.
4.2 Identify the causes for which a chain may be too-long or too-short.
4.3 Calculate the correct distance and area from measured distance and area when the chain was too-long or too-short.
4.4 Compute correct length of line after necessary correction due to variation of pull, sag and slope.

5 Understand the preparation of a chain survey map

5.1 List the instruments and materials required for plotting a survey map.
5.2 Identify suitable scale for plotting a map.
5.3 Describes the procedure of plotting a survey map from field book.
5.4 Identify conventional symbols used in plotting maps.

6 Understand different methods of computing areas.

6.1 Describe different methods of computing areas within regular and irregular perimeters.
6.2 Carry out the field work for calculation of areas within regular and irregular perimeters.
6.3 Find the area along boundary by mid-ordinate rule, average ordinates rule, trapezoidal rule, and Simpson's rule.

7 Understand the basic terms used in compass survey.

7.1 List the instrument and accessories required for compass survey.
7.2 Define the 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.
7.3 Define fore bearing and back bearing.
7.4 Find back bearing from fore bearing and fore bearing from back bearing.
7.5 Convert whole circle bearing to reduced bearing and reduced bearing to whole circle bearing.
7.6 Define local attraction.
7.7 Identify local attraction and correct the observed bearings.

8 Understand the basic concept of cadastral survey.

14.1 Define cadastral survey.
14.2 Identify scale used in cadastral survey.
14.3 List the equipment and accessories used in cadastral survey.
14.4 Define the terms:- Quadrilaterals, intersections, shikmi, chanda, check line, field, khaka.
14.5Describe the procedure of cadastral survey.
14.6 Explain the procedure of preparing a cadastral survey map.

9 Understand basic concept of plane table survey.

9.1 Describe the purpose and scope of plane table surveying.
9.2 List the instruments and accessories required for plane-table survey.
9.3 Describe the procedure of setting up plane table.
9.4 Explain the term orientation.
9.5 Describe orientation by back sighting.
9.6 Name the methods of plane table survey.
9.7 Describe radiation, intersection, traversing and resection methods.

10 Understand the concept of leveling and bench mark.
10.1 Describe the purpose of leveling.
10.2 Explain the following terms in leveling.
a) Level surface; b) Level line; c) Horizontal surface; d) Horizontal line; e) Vertical plane; f) Vertical line; g) Datum surface; h) Datum; i) Reduced level; j) Formation level
10.3 State the meaning of bench mark.
10.4 Compare GTS, permanent, arbitrary and temporary bench mark.
10.5 Identify different types of level.
10.6 Label different parts of a level.
10.7 Explain the following terms related to leveling:
a) Line of collimation; b) Axis of telescope; c) Axis of bubble tube; d) Vertical axis; e) Height of instrument; f) Plane of collimation; g) Focusing; h) Parallax
10.8 Identify different types of leveling staff.

11 Understand the temporary and permanent adjustment of leveling Instrument.
11.1 Mention different kinds of adjustments of level.
11.2 Mention different steps of temporary adjustment.
11.3 Identify the fundamental lines of leveling instrument.
11.4 Mention the procedure of adjustments and rectifying the various defects in adjustment of dumpy level and auto set.

12 Understand the various aspects of leveling.
12.1 Explain the meaning of following terms as used in leveling:
a) Back sight, foresight and intermediate sight reading; b) Change point; c) Station.
12.2 Mention the procedure of holding a leveling staff.
12.3 Mention the procedure of leveling work.
12.4 Mention the necessity of level book or field book.
12.5 Identify different kinds of level book or field book.
12.6 Describe the term reduction of leveling.
12.7 Mention the procedure of booking of staff reading into level book.
12.8 Solve problems on reduction of leveling.
12.9 Solve problems on calculation of missing data of old level book.

13 Understand the difficulties and errors in leveling.
13.1 List the instrumental and personal errors in leveling.
13.2 Explain the effects of earth's curvature and refraction of light on leveling.
13.3 Express the derivation of the formula for earth curvature and refraction of light.
13.4 Solve problems on errors due to curvature and refraction.
13.5 Express the deduction of the formula for distance to the visible horizon and dip of the horizon.
13.6 Solve problems on visible horizon and dip of the horizon.
13.7 Mention the common mistakes in leveling.
13.8 Mention the magnitude and permissible limits of closing error in leveling.

14 Understand the aspects of contouring.
14.1 Explain the terms contour, contouring, horizontal equivalent and vertical interval.
14.2 Mention the characteristics of contour.
14.3 List the uses of contour.
14.4 Mention the different methods of contouring (direct method and indirect method).
14.5 State the procedure of different methods of contouring.
14.6 Explain interpolation of contour by estimation method only.
14.7 Mention the procedure of drawing contour map.
14.8 Draw contour maps.

Practical:

1. Measure length of line by chain and tape.
2. Set perpendiculars with the help of chain and tape.
3. Set perpendiculars with the help of optical square.
4. Measure distances across obstacles.
5. Calculate the area of a map with the help of planimeter.
6. Measure magnetic bearing by prismatic and surveyors compass.
7. Plot the map of a place by radiation, intersection and traversing.
8. Locate the position of the instrument station on the plan of the plane table by solving two points problem.
9. Measure the area of a plot from mouza map.
10. Locate the boundary line of a property with the help of chain, tape and plane table which is already plotted on the mouza map.
11. Perform temporary adjustments of level.
12. Perform leveling in the field.
13. Conduct contouring by direct method over a low lying/elevated area, prepare contour map and calculate the quantity of earth work in filling/cutting.

REFERENCE BOOKS

1 Surveying and Leveling- T. P. Kanatker
2 Surveying- Aziz & Shahjahan
3 Surveying- B. C. Punmia

68834 CONSTRUCTION METHODOLOGY-I

T	P	C
3	3	4

AIMS

To be able to develop knowledge, skill and attitude of construction methodology with special emphasis on:

- concrete and its quality
- pre-stressed concrete and its application
- cavity walls.
- masonry and different types of walls..
- plastering and pointing
- tiles & mosaic works.
- patent stone flooring & damp proof work.

SHORT DESCRIPTION

Concrete; Pre-stressed concrete, brick masonry; composite masonry; cavity wall; plaster and pointing; tiles & mosaic works; patent stone flooring & damp proof work.

DTAIL DESCRIPTION

Theory:

1 Understand the features of concrete.

1.1 State the meaning of concrete.
1.2 Mention the uses of concrete in the construction industry.
1.3 Mention different kinds of concrete.
1.4 List the ingredients of different kinds of concrete.
1.5 Describe the functions of the ingredients of concrete.
1.6 Mention the advantages and limitations of 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 Mention 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.
2.7 Discusses factors influencing choice between site mix and ready-mixed concrete.

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

3.1 Describe the methods of concrete mix design. .
3.2 Calculate different proportion of concrete mixes using simple nominal standard mix design method.
3.3 Describe how beaching of concrete mix is achieved by volume and weight.
3.4 Mention the comparison of various processes used to mix concrete.
3.5 Mention the various methods of transporting concrete.
3.6 Mention the sequence of placing concrete in different situations.
3.7 Describe the processes of compaction of concrete.

4 Understand the curing of concrete.

4.1 State the meaning of curing.
4.2 Describe different methods of curing.
4.3 Mention the advantages and limitations of various methods of curing.

5 Understand the tests of concrete.

5.1 Describe standard test information to establish the properties of various types of aggregates.
5.2 Express how to draw the grading curve for various samples of Aggregate.
5.2 Describe how to determine the FM value from the grading curve.
5.3 Mention the necessity of the following tests on concrete.
a) slump test
b) Compressive test of cylinder.
c) Compressive test of cube.

6 Understand the pre-stressed concrete.
6.1 Explain the term pre-stressed concrete.
6.2 Describe different methods of pre-stressing
6.3 Mention the advantages of pre-stressing concrete
6.4 Mention the application of pre-stressed concrete
6.5 Mention the classification of pre-stressed concrete
6.6 List the essential materials & equipment for pre-stressed concrete

7 Understand the supervision of concrete construction.
7.1 Mention the special precautions to be observed for concreting under water.
7.2 List the special precautions to be observed for concreting in cold weather.
7.3 List the special precautions to be observed for concreting in hot water.
7.4 Describe the factors to be considered while supervising good quality RCC construction

8. Understand the features of brick masonry.
8.1 Mention the meaning of brick masonry.
8.2 Mention the specific uses of different brick masonry tools.
8.3 Distinguish among different types of masonry structures.
8.4 Identify the following terms of brick masonry: stretcher, header, lap, course, bed, joint, closer, queen closer, king closer, beveled closer, mitered closer.
8.5 Identify the defects in brick masonry.
8.6 List the factors to be considered while supervision brick masonry work.

9. Understand the bond in brick masonry.
9.1 Define bond.
9.2 Mention the functions of good brick bonding.
9.3 Describe the steps for brick laying.
9.4 Mention different types of bonds in brick masonry.
9.5 Draw the neat sketch of different types of bonds in brick masonry.

10. Understand the composite masonry.
10.1 State the meaning of composite masonry.
10.2 Mention different types of composite masonry.
10.3 Mention the advantages and limitations of using Reinforced brick masonry.

10.4 Mention the advantages and limitations of hollow block masonry.

11 Understand the cavity walls.

11.1 Mention the need of cavity wall construction.
11.2 Mention the advantages and limitations of cavity wall of Solid brick walls.
11.3 Describe with sketch the cavity walls at opening and lintels.
11.4 Identify different types of wall tie used in cavity wall.
11.5 Determine the spacing of wall ties used in cavity wall.
11.6 Describe the construction procedure of cavity walls.

12. Understand the plastering and pointing.

12.1 State the purpose of plastering and pointing.
12.2 Mention the common tools for plastering works with their functions.
12.3 Describe the process of applying plaster on a new surface.
12.4 Mention the common defects in plastering and pointing.
12.5 Describe how the defects of plastering and pointing can be rectified.
12.6 Name the different kinds of pointing with sketches.
12.7 Describe the process of pointing works.
12.8 Distinguish between plastering and pointing.

13 Understand the tiles & mosaic works.

13.1 Mention the purpose of mosaic & tiles works.
13.2 Describe the proportion materials used in mosaic & tiles works.
13.3 Describe the process of preparation of surface to be done before applying mosaic & tiles on floor and wall.
13.4 Describe the process of applying mosaic & tiles on floor.
13.5 Mention the common tools used for mosaic & tiles works.
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14 Understand the patent stone flooring.

14.1 Mention the purpose of planet stone
14.2 Describe the materials used in patent stone work.
14.3 Describe the process of preparation of surface before applying patent stone.
14.4 Describe the process of applying patent stone on floor on patent stone floor.
14.7 Mention the common defects in patent stone.

15. Understand the painting work on masonry.

15.1 Mention the purpose of painting.
15.2 Name the ingredients of paint.
15.3 Mention the specific function of each ingredient of paint.
15.4 Describe the characteristics of good paint. •
15.5 Mention the classification of paint with their suitability for use in different situations.
15.6 Describe the process of applying paints on new and old surface of the following:
a. plaster or masonry and other absorbent surface
15.7 Mention various defects in painting.
15.8 Describe the factors that should be considered during the supervision of quality painting work.
15.9 Differentiate between the properties and ingredients of the following:
a. white wash and color wash
b. distemper and snowcem wash
c. oil based paint and water based paint
d. plastic emulsion paint and synthetic enamel paint.

15.10 Describe the procedure of application of the following on new and old specific surfaces:

a. white wash
b. color wash
c. distemper
d. snowcem (cement based paint)
e. plastic emulsion paint
f. synthetic enamel paint
g. weather coat paint

16. Understand the Damp proof work.

16.1 Mention the causes of dampness in building.
16.3 Describe the method of damp proofing of building.
16.4 Mention the requirements of ideal damp proofing materials.
16.5 Describe the damp proof course (DPC) treatment for basement and wall on untrained soil with sketchers.
16.6 Describe the DPC treatment for basement and wall in damp soil with sketches.

Practical:

1. Determine the slump of different concrete works.
2. Determine the effects of different mix proportions on the strength and workability of concrete by experiment and test.
3. Determine the effects of different curing methods/duration of the strength of concrete.
4. Conduct the cylinder test for concrete and interpret the results.
5. Conduct the cube test for concrete and interpret the results'.
6. Construct layout of brick wall in a floor.
7. Perform plaster work in a new surface.
8. Perform tiles work in a floor.
9. Perform tiles work in a wall.
10. Perform D.P.C in a brick wall.
11. Prepare a wall surface for painting work.
12. Perform painting work of a prepared surface.

Reference Book:

1. Building Construction – Dr. B.C Punmia
2. A Text Book of Construction- SP Aurora & SP Brinda
3. Building Construction –GJ Kulkani

68833 CONSTRUCTION SAFETY PRACTICES

T	P	C
1	3	2

AIMS

To provide knowledge, skill and attitude for safety in Construction site with special emphasis on:

- understanding the different construction site safety.
- developing knowledge of different construction site safety.
- recognizing the role of "Occupational Safety and Health Administration" (OSHA) in the workplace and describe the causes of the most common workplace injuries.
- identifying the hazards those prompt the use of fall protection for workers at the jobsite.
- creating a working emergency action and fire prevention plan.
- naming factors that pose a hazard to employees working in excavations, and identify how to reduce those hazards.
- imparting knowledge and skill to use tools, machines, equipment's of site safety purpose.

SHORT DESCRIPTION

Construction safety practice; personal protecting equipment (PPE); fall protection at construction site; Construction site safety of stairways, ladders and scaffolds, safety arrangements of excavation works; the electrical safety and fire protection in construction site; Safety handling of tools and materials

DETAIL DESCRIPTION

Theory:

1 Understand construction safety practice.

1.1 State the meaning of construction safety.
1.2 Mention the term OSHA in the workplace.
1.3 Distinguish between employer and employee rights and responsibilities.
1.4 Describe the following terms:
  a. communication skills,
  b. interpersonal skills,
  c. time management
  d. presentation skills
1.5 Importance of record keeping responsibilities on site.

2. Understand the personal protective equipment

2.1 Mention the necessity of personal protection.
2.2 List the personal protective equipment (PPE) used to protect workers.
2.3 Describe with sketch the personal protective equipment (PPE) those are most often used to protect team members involved in the work.
2.4 Describe the causes of the most common workplace injuries.
2.5 Describe the necessity of personal protecting equipment (PPE).
2.6 Describe about following part of personal protecting equipment:
   a. protection from head injuries.
   b. eye protection.
   c. hearing protection.
   d. foot protection.
   e. hand and body protection.

3. **Understand the fall protection at construction site.**

3.1 Mention fall protection.
3.2 Describe methods of fall protection available to workers.
3.3 Describe personal fall arrest systems.
3.4 Describe the necessity of guardrails and safety nets.

4. Understand the construction site safety of stairway, ladder and scaffold.

4.1 Describe safety guidelines and requirements for stairways used at a construction site.
4.2 List safe practices and requirements for ladders used at a construction site.
4.3 Name the common accidents in lifting operations.
4.4 Recognize the hazards associated with different types of scaffold.

5. Understand the safety arrangements of excavation works.

5.1 State the greatest risk that is present at an excavation.
5.2 Name factors that pose a hazard to employees working in excavations, and how to reduce those hazards
5.3 Mention the term “safe working conditions”.
5.4 Name various type of protecting system from hazard during excavation work.

6. Understand the electrical safety and fire protection in construction site.

6.1 List different kind of electrical hazard.
6.2 Describe the basic of electrical safety and the injuries.
6.3 Identify the hazards of electricity on a construction site and the best way to prevent those hazards from occurring.
6.4 Describe the necessity to create a working emergency action and fire prevention plan.
6.5 Briefly discuss about electrical shocks and their prevention.

7. Understand the hazard communication.

7.1 List hazard that may be occur during project construction to make an emergency action plan.
7.2 Describe the necessity of risk assessment.
7.3 Mention the necessity of health and safety management.
7.4 Describe the necessity of accident prevention.
7.5 Describe the process of accident investigation and analysis.
7.6 Write a report on accident in a practical site.

8. Understand the construction site safety from tools and materials handling.

8.1 List various tools that may causes of accidents, diseases, injuries, and dangerous occurrences.
8.2 Identify, avoid, and control hazardous materials through proper handling, storage, use and disposal.
8.3 Explain the basic procedures for safe materials handling.

Practical:

1. Identify different instruments & accessories required for construction safety.
2. Perform a job wearing PPE.
3. Perform safety practice for fall protection at construction site.
4. Perform safety practice for scaffolds failure protection at construction site.
5. Locate the positions of fire extinguish accessories in a building and show its use.
6. Perform safety practice in an excavation work.
7. Identify the hazards of electricity on a construction site and follow the best way to prevent those hazards from occurring.
8. Write a report on accident in a practical site.
9. Perform the correct procedure of handle materials safely.
10. Visit a fire station and submit a report.

REFERENCE BOOKS

1. Construction safety practices and Principals
   - Robert X. peyton & Toni C Rubio

2. Construction Safety Management
   - Tim Howarth & Paul Watson

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

65812 PHYSICAL EDUCATION AND LIFE SKILL DEVELOPMENT T P C
0 3 1

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

Warm up; Yoga; Muscle developing with equipment; Meditation, First aid; sports science, Games & sports; Life skill development.

DETAIL DESCRIPTION

1. National Anthem and Assembly

1.1 Line and File.
1.2 Make assembly.
1.3 Recitation of national anthem.
1.4 National anthem in music.

2. Warm up

2.1 **General Warm-up :**
Spot running (Slow, Medium & Fast), Neck rotation, Hand rotation, Side twisting, Toe touching, Hip rotation, Ankle twisting, Sit up and Upper body bending (Front & Back).

2.2 **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.

2.3 **Specific warm up :**
Legs raising one by one, Leg raising in slanting position, Knee bending and nose touching, Heels raising, Toes touching (standing and laying position), Hand stretch breathing (Tadasana, Horizontal, Vertical).

2.4 Mass Physical Exercise
Hand raising, Side twisting, Front & back bending, Front curl, Straight arm curl two hand, Hands raising overhead and Push up.

3. Yoga

3.1 Dhyanasan : Shabasan, Padmasan, Gomukhasan, Sharbangasan, shashangasan Shirshasan
3.2 Shasthyasan : Halasan, Matshasan, Paban Muktasan, Ustrasan.
3.3 Prana and Pranayama: Nadisuddhi Pranayma, cooling pranayamas (sitali pranayama, Sitkari Pramayama, sadanta pranayama), Ujjayi pranayama,

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.
4.4 Horizontal bar : Chinning the bar with front grip, Chinning the bar with wide back grip.
4.5 Jogging Machine : Slow, Medium, and Fast running.
4.6 A. B king pro (Rowing Machine): Sit up.
4.7 Sit up bench: Sit up.

5 **Meditation**

5.1 Define meditation.
5.2 Classification of Meditation.

5.3 Nadanusandhana (A-Kara chanting, U-Kara chanting, M-Kara chanting, AUM-kara chanting.
5.4 OM-Meditation.
5.5 Cyclic Meditation (Starting Prayer, Instant Relaxation Technique, Centring, Standing Asanas, Sitting Asanas, Quick Relaxation Technique).

6. **First Aid**
6.1 Define First Aid.
6.2 What do you mean by First Aider.
6.3 Discuss the responsibilities of a First Aider.
6.4 Different types of equipment of First Aid.
6.5 Muscle Cramp-Ice application (Remedy).
6.7 Dislocation-Ice application (Remedy).

7. Rules and Technique of games and sports
7.1 Kabadi.
7.2 Football.
7.3 Cricket.
7.4 Badminton.
7.5 Athletics.
7.6 Swimming.

8. Sports Science
8.1 Definition of Exercise physiology.
8.2 Function of muscles.
8.3 Concept of work, energy and power.
8.4 Effect of exercise on heart and circulatory system.
8.5 Motor components for physical fitness.
8.6 Definition of sports Biomechanics.
8.7 Definition of sports psychology.
8.8 Meaning of nutrition, Diet and Balanced diet.
8.9 Meaning of the terms –Test, measurement and Evaluation.

9. Show skill on conversation on day to day life
9.1 Today's Market price.
9.2 Festivals(religious festivals, National festivals).
9.3 Celebration of National days.
9.4 Aim in life.
9.5 Visited historical places/sites.

10. Human relation
10.1 Family relation.
10.2 Relation with nighbour.
10.3 Humanitarian Service.
10.4 Service for handicapped (intelligent, physical, social etc).
10.5 Service for orphan / Patient.

11 Vote of appreciation
11.1 About dress .
11.2 For good work.
11.3 For good result.
11.4 For good news.

12. Stress Management
12.1 Habit to be a man of humor.
12.2 Always brain should be cool.
12.3 Positive thinking.
12.4 Factors that determine our attitude.
12.5 The benefits of a positive attitude.
12.6 Steps to building a positive attitude.

13 Time Management

13.1 Determine essential time for a task.
13.2 Determine delay and unexpected time.
13.3 Determine time for daily activities .
13.4 Plan for daily activities.

14 Interview Technique

14.1 Mental preparation to face an interview.
14.2 Selection of dress for interview.
14.3 Introducing himself/herself to the interviewer .
14.4 Coping interview.

15 Team work

15.1 Organized a team.
15.2 Selection of team leader.
15.3 Distribution the task to the members.
15.4 Accepting opinion of team members.
15.5 Completion of task as a team.

16 Social work

16.1 Tree plantation.
16.2 Community service.
16.2.1 Rover Scout.
16.2.2 Sanitation.
16.2.3 Pure drinking water.
16.2.4 Social Culture.

Reference Book

Modern Yoga _Kany Lal Shah
Rules of games and sports_ Kazi Abdul Alim
Yoga _ Sobita Mallick
Iron Man_ Nilmoni Dass