BANGLADESH TECHNICAL EDUCATION BOARD

4-YEAR DIPLOMA-IN-ENGINEERING PROGRAM

ENVIRONMENTAL TECHNOLOGY

SYLLABUS

THIRD & FORTH SEMESTER

Environmental Technology (90)

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.	9031	Environmental Surveying	2	3	3	20	80	25	25	150
2.	6811	Basic Electronics	2	3	3	20	80	25	25	150
3.	6632	Computer Application-2	0	6	2	-	-	50	50	100
4.	6431	Civil Engineering Drawing (CAD)-1	1	6	3	10	40	50	50	150
5.	5931	Mathematics-3	3	3	4	30	120	50	-	200
6.	5922	Physics-2	3	3	4	30	120	25	25	200
7.	5811	Social Science-1	2	0	2	20	80	-	-	100
8.	5722	English-2	2	2	3	20	80	50	-	150
		Total	**15**	**29**	**25**	**150**	**600**	**300**	**200**	**1250**

Environmental Technology (90)

4th 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.	9041	Natural Resources & Their Conservation	2	0	2	20	80	-	-	100
2.	9042	Environmental Chemistry	3	3	4	30	120	25	25	200
3.	6442	Estimating & Costing-1	3	3	4	30	120	25	25	200
4.	6445	Hydraulics	3	3	4	30	120	25	25	200
5.	6441	Geotechnical Engineering	2	3	3	20	80	25	25	150
6.	6444	Construction Process-1	3	3	4	30	120	25	25	200
7.	5821	Social Science-2	2	3	3	20	80	-	-	100
8.	5841	Business Organization & Communication	2	0	2	20	80	-	-	100
		Total	**20**	**18**	**26**					**1300**

9031 ENVIRONMENTAL SURVEYING

T	P	C
2	6	4

AIMS

- To be able to understand the scope of surveying.
- To be able to understand a horizontal and vertical distances.
- To be able to use of surveying instruments and accessories.
- To be able to conduct different surveying work
- To be able to perform city survey.

SHORT DESCRIPTION

Basic knowledge about surveying; Distance measuring instruments; Making points and ranging of lines; Chain surveying; Concept of leveling; Various aspects of leveling; Classification of leveling; Contouring; Application of contour maps; Fundamentals of theodolite; Traversing by theodolite; Calculation of area and volume, Plane table surveying; Various instrument for surveying, city survey.

DETAIL DESCRIPTION

Theory

1. Understand the fundamental definitions and concepts of surveying

1.1. Define surveying
1.2. Find out the importance of surveying
1.3. State the necessity of surveying in environmental engineering.
1.4. Describe the classification of surveying
1.5. Discuss the principles of surveying
1.6. Mention the units of measurements
1.7. Express the useful data and formulae relating to surveying
1.8. List down the scales of surveying
1.9. Look for error due to use of wrong scale
1.10. Express the character of work

2. Understand the concept of linear measurements

2.1. Write down the different methods of linear measurements
2.2. Describe the direct measurement procedure of linear measurement
2.3. Make a list of instrument for measuring distance
2.4. Make a list of instrument for marking stations
2.5. Describe ranging out survey lines
2.6. Describe chaining a line
2.7. Describe chaining on sloping ground
2.8. Describe errors in chaining
2.9. Describe tape corrections
2.10. Describe degree of accuracy in chaining
2.11. Describe precise liner measurement
2.12. Solve problems relating to line measurement

3. Understand the concept chain surveying

3.1. Illustrate the principles of chain surveying
3.2. Describe offsets
3.3. Explain field book
3.4. Explain field work
3.5. Create a list of instruments for setting out right angles
3.6. Describe cross staff
3.7. Describe optical square
3.8. Describe right angle with chain or tape
3.9. Describe obstacles in chaining
3.10. Describe cross staff survey
3.11. Describe plotting chain survey
3.12. Solve problems related to chain survey

4. Understand the concept of compass and chain traversing

4.1. Make a list of instrument for the measurement of directions and angles
4.2. Define of traverse survey
4.3. Express the units of angle measurement
4.4. Make list of instruments for measurements of angles
4.5. Describe prismatic compass
4.6. Describe surveyor's compass
4.7. Describe bearing of lines
4.8. Describe local attraction
4.9. Describe traversing with the chain and compass
4.10. Describe magnetic declination
4.11. Summarize precautions in using compass
4.12. Explain Errors in compass survey

5. Understand the concept of theodolite traversing

5.1. Define theodolite
5.2. Mention various types of theodolite
5.3. Find out the essentials of the transit theodolite
5.4. Define the following terms: vertical axis, horizontal axis, line of collimation, level tube, centering, transiting, swinging the telescope, face left observation, face right observation, telescope normal, telescope inverted, changing face, pivots and azimuths.
5.5. Describe temporary adjustments
5.6. Describe measurement of horizontal angles
5.7. Describe measurement of vertical angles
5.8. Describe miscellaneous operations with theodolite
5.9. Find out sources of errors in theodolite work

6. Understand the concept of leveling

6.1. Define the following terms: leveling, level surface, level line, horizontal plane, horizontal line, vertical plane, vertical line, datum, elevation, vertical angle, mean sea level, bench mark, back sight, foresight, intermediate sight, change point, station, height of instrument, focusing, parallax.

6.2. Describe the methods of leveling
6.3. Make list of leveling instrument
6.4. Describe leveling staff
6.5. Describe temporary adjustment of level
6.6. Describe reduction of level
6.7. Summarize the hand signals during observations
6.8. Describe booking and reducing levels
6.9. Describe profile leveling
6.10. Describe cross-sectioning
6.11. Find out leveling problems
6.12. Explain the errors in leveling
6.13. Describe degree of precision
6.14. Describe sensitiveness of bubble tube
6.15. Describe contouring
6.16. Describe characteristics of contour lines
6.17. Describe the methods of locating contours
6.18. Describe contour drawing
6.19. Solve problems relating to leveling

7. Understand the concept of plane table surveying

7.1. Define plane table
7.2. Make list of general accessories required to plane table surveying
7.3. Describe the methods of plane tabling
7.4. Describe two point problem
7.5. Describe three point problem
7.6. Explain the errors in plane tabling
7.7. State the advantages and disadvantages of plane tabling

8. Calculate the area

8.1. Make a list of various unit relating to area
8.2. Describe general methods of determining areas
8.3. Describe computation of areas from field notes
8.4. Describe computation of areas from plan
8.5. Describe planimeters
8.6. Solve problems relating to area calculation

9. Measure the volume

9.1. Describe the methods of volume measurement
9.2. Make measurement from cross-section
9.3. Describe extent of earth work
9.4. Describe prismoidal correction
9.5. Describe curvature correction
9.6. Describe volume from spot level
9.7. Describe volume from contour plan
9.8. Solve problems relating to volume measurement

10. Understand the basic ideas of minor instruments

10.1. Scales
10.2. Bubble tubes
10.3. Hand level
10.4. Abeny clinometer (Abeney level)
10.5. Indian Pattern clinometer (tangent clinometer)
10.6. Burel hand level
10.7. De Lisle's clinometer
10.8. Foot-rule clinometer
10.9. Ceylon ghat tracer
10.10. Fennel's clinometer
10.11. Pentagraph
10.12. Sextant

11. Understand the basic ideas of special instruments

11.1. Site square
11.2. Autoset level
11.3. Transit level
11.4. Special compass
11.5. Brunton universal pocket transit
11.6. Mountain compass transit
11.7. Geodimeter
11.8. Tellurometer
11.9. Wild 'Distomats'
11.10. Global positioning system (GPS)
11.11. Total Station

12. Understand the procedure of city survey

12.1. Explain the purpose of city survey.
12.2. List the maps required for city survey.
12.3. Describe the methods of establishing horizontal and vertical control.
12.4. List the instrument required for city survey.
12.5. Describe the method of preparing topographic map of a city.
12.6. Explain the objects of the property survey of a city.
12.7. Describe the method of preparing property map of a city.
12.8. Describe the method of preparing wall map of a city.
12.9. Describe the method of preparing underground map of a city.
12.10. Describe the method of locating details of a city.
12.11. Explain the system of preservation of detail notes of city survey.

Practical

1. Measure horizontal, vertical and slope distances in the field by using tapes.
2. Measure land distance by surveying chain.
3. Perform measurement of distance along chain across obstacles (river or pond).
4. Perform the measurement of distance between two points obstructed by hill or ridge.
5. Determine plumb line from a point on the ground.
6. Measure vertical distance (difference in elevation) between a line of sight and required point above or below it by level rod.

7. Measure directions and angles in the field by magnetic compass.
8. Measure square of a work piece by optical square.
9. Perform a field work to measure height of a field by digital level.
10. Determine horizontal and vertical angle by using a Theodolite.
11. Perform temporary adjustment of automatic level.
12. Perform permanent adjustment of automatic level.
13. Measure angle between two visible objects by sextant.
14. Measure angles of slope (or tilt), elevation or depression of an object with respect to gravity by clinometer.
15. Prepare a map using mapping software and data received with GPS receiver.
16. Perform a field work to measure topographic feature by using total Station.
17. Measure the area of a plan by planimeter
18. Measure length of curve line on topographical maps, plans and charts by curvimeter.
19. Copy plans, maps and other drawings, on the same, or on a reduced or an enlarge scale by pantograph.

References

1. Kanetkar, Late T.P., Kulkarni. S.V. 2007. Surveying and Leveling, Part 1. Pune Vidyarthi Griha Prakashan, Pune-411030. ISBN 81-85825-11-4.
2. Punmia. Dr. B.C., Jain. Ashok K., Jain. Arun K. 2005. Surveying, Vol. 1. Laxmi publications Ltd., New Delhi. ISBN 81-7008-853-4.
3. Shahajahan. M., Aziz. M.A. 2005. A Text Book of Surveying. Hafiz Book Center, Dhaka.

6811	BASIC ELECTRONICS	T	P	C
		2	3	3

OBJECTIVES

- To provide understanding soldering technique and color code.
- To provide understanding and skill on the basic concept of semiconductor and to identify physically a range of semiconductor diodes.
- To develop comprehensive knowledge and skill on special diodes and devices.
- To develop the abilities to construct different rectifier circuits.
- To provide understanding of the basic concept and principle of transistor and to identify physically a range of transistor.
- To provide understanding and skill on the basic concept of logic gates.
- To provide the understanding skill on using Electronic measuring and testing equipment.

SHORT DESCRIPTION

Color code and soldering; Semiconductor; P-N junction diode; Special diodes and devices; Power supply; Transistor; Transistor amplifier; Logic gates Electronic measuring and test equipment.

DETAIL DESCRIPTION

Theory:

1 Understand the Concept of soldering and Color Code.

1.1 Define soldering.
1.2 Describe the different types of solder.
1.3 List the things needed in soldering.
1.4 Mention the properties of a good soldered joint.
1.5 Describe the functions and construction of (i) Single sided, (ii). Double sided & (III) Multi layered Printed circuit board.
1.6 Mention the function of resistor, capacitor and inductor in electronic circuits.
1.7 Describe the procedure of determining the value of Capacitor, & Resistor using numeric and color code.

2 Understand the Concept of Semiconductor.

2.1 Define Conductor, Semiconductor and Insulator.
2.2 Describe Semiconductor with atomic structure.
2.3 Describe the effect of temperature on conductivity of Semiconductor.
2.4 Explain the energy band diagram of Conductor, Semiconductor and Insulator.
2.5 Classify Semiconductor.
2.6 Describe the generation & recombination of hole and electron in Intrinsic Semiconductor.
2.7 Define doping, P-type & N-Type material, covalent bond, majority & minority charge carrier.
2.8 Explain the characteristics of Carbon, Gallium Arsenide/Phosphide.

3 Understand the Concept of P-N Junction Diode

3.1 Define PN junction diode
3.2 Describe the formation of depletion layer in PN junction.
3.3 Discuss potential barrier, drift & diffusion current and their physical significance.
3.4 Mention the behavior of PN junction under forward and reverse bias.
3.5 Explain the forward & reverse current voltage (IV) characteristics of PN junction diode.
3.6 Explain the effect of temperature Si & Ge diode characteristics
3.7 Define (i) static resistance (II) Dynamic resistance, (III forward breakdown voltage and (II) Reverse break down voltage.
3.8 Draw the equivalent circuit of PN junction diode.
3.9 Describe the specification of diode.

4 Understand the DC power supplies.

4.1 Define dc power supply.
4.2 Mention the importance of dc power supply.
4.3 Define rectification and rectifier.
4.4 Explain the operation of Half wave, Full wave and Bridge rectifier.
4.5 Discuss ripple factor & efficiency and TUF of Half wave, Full wave and Bridge rectifier.
4.6 Explain the operation of different types filter circuits with wave shape.
4.7 Define regulated and unregulated power supply.
4.8 Describe the block diagram of a typical regulated dc power supply.

5 Understand the Concepts of Special diode.

5.1 Define Zener break down.
5.2 Describe the operation of Zener diode.
5.3 Explain IV characteristics of Zener diode.
5.4 Describe the application of Zener diode in (i) voltage stabilization, (ii) meter protection and (II) peck clipper circuits.
5.5 Describe the construction operation and application of (I) Tunnel diode (II) varactor diode (III) Schottky diode (iv) Step-Recovery diode (v) PIN diode, (vi) LED (vii) LCD (viii) photo diode (ix) Solar cell.
5.6 Describe the construction operation and application of (i) DIAC (ii) TRIAC and (iii) SCR.

6 Understand the construction and operation of Bipolar Junction Transistor (BJT)

6.1 Define Transistor.
6.2 Describe the construction PNP and NPN Transistor.
6.3 State the biasing rules of BJT.
6.4 Explain the mechanism of current flow of PNP and NPN Transistor.
6.5 Establish the relation among Base, Emitter and Collector current ($I_E = I_C + I_B$)
6.6 Draw the three basic transistor configuration circuits (CB, CC, CE).
6.7 Describe current amplification factor α , β and γ.
6.8 Establish the relation among α , β and γ.
6.9 Solve problem related to I_E, I_C, I_B, α , β and γ.

7 Understand the concept of BJT Amplifier

7.1 Define (i) Amplifier (ii) Amplification and (III) Gain
7.2 Mention the classification of Amplifier.
7.3 Describe the principle of operation of a common emitter (CE) Amplifier.
7.4 Draw DC & AC equivalent circuits of the CE amplifier circuit.
7.5 Mention the formula of (i) input resistance (ii) Output Resistance (iii) Current gain (iv) Voltage gain and (v) power gain.
7.6 Solve problem related to different gain resistance.

8 Understand the main feature of digital electronics

8.1 Describe the difference between analog and digital signal.
8.2 State the advantage of digital system.
8.3 Define logic gate.
8.4 Describe the basic operation of logic gates AND, OR, NOT NAND, NOR, XOR & XNOR.
8.5 Prepare truth table of logic gates AND, OR, NOT NAND, NOR, XOR & XNOR.

9 Understand the Electronic measuring and testing equipment

9.1 Define AVO meter.
9.2 Describe the procedure of measuring current, voltage and resistance using AVO meter.
9.3 List the control knobs of Oscilloscope.
9.4 Explain the procedure of measuring frequency and voltage using Oscilloscope.
9.5 Mention the function of (i) Function Generator (ii) Logic Probe (iii) Semiconductor Tester.

Practical :

1 Show skill in identifying the electronic components.

1.1 Observe the electronic components board and read the manuals.
1.2 Identify the different types of resistors with their values, tolerance and wattage.
1.3 Identify the different types of potentiometers with their values, & wattage.
1.4 Identify the different types of capacitors with their values, dc working voltages and types.
1.5 Identify the different types of diodes & rectifiers with the numbers and specifications.
1.6 Identify the different types of transistors and thyristors with their number and specifications.
1.7 Identify the different types of LED's, IC's and miniature relays with their number & specification.
1.8 Identify different types of transformer with their specification.
1.9 Identify different inductors with their values & current ratings.
1.10 Study the printed circuit boards.
1.11 Sketch the symbols of components used in electronic circuits.
1.12 Describe the basic function of each component.
1.13 Write a report on above activities.

2 Show skill in electrical measurement.

2.1 Perform simple voltage and current measurements on basic series and parallel resistor circuits using the following instruments.

a) Voltmeters and ammeters
b) AVO meters
c) Digital multimeter
d) Basic CRO

3 Show skill for determining the values of different resistors and capacitors with the help of color code.

3.1 Select color code resistors & capacitors of different values.
3.2 Identify the colors and their numerical numbers.
3.3 Determine the value of resistors with tolerance.
3.4 Determine the value of capacitors and dc working voltage.
3.5 Write a report on above activities.

4 Show skill in performing soldering.

4.1 Select wires (single strand and multi strand) and cut wires to required length.
4.2 Select soldering iron, soldering tag and soldering lead.
4.3 Remove wire insulation to required length.
4.4 Clean and tin both iron and work piece.
4.5 Use a tinned iron in order to transfer adequate heat to the joint.
4.6 Joint two singles stranded wires mechanically and solder.
4.7 Joint two multi-strand wires mechanically and solder.
4.8 Perform soldering exercise for making three dimensional wire frame.
4.9 Sketch and write a report on the job.

5 Show skill in soldering & desoldering of electronic components and wires to the other components and circuit boards.

5.1 Select electronic components, wires and PCB.
5.2 Determine the rating of the soldering iron suitable for the work piece.
5.3 Clean and tin both iron & work piece.
5.4 Feed new soldering materials to the tinned and heated joint, in order to produce a correctly soldering.
5.5 Check the quality of soldering.
5.6 Clean and tin iron and de-solder the joint and components.
5.7 Use solder suckers and solder braid for de-soldering.
5.8 Write a report on the Job.

6 Show skill in checking the semi-conductor diode.

6.1 Collect a range of semi-conductor diodes and manufactures literature.
6.2 Select the digital multimeter and set the selector switch to ohm range.
6.3 Determine the specification of semi-conductor diode.
6.4 Compare the determined specification with that of manufactures literature.
6.5 Measure forward & reverse resistances of the diode.
6.6 Identify p and p side of the diode.
6.7 Determine the condition of the diode.

7 Show skill in sketching forward and reverse characteristics curves of a semiconductor diode.

7.1 Select meter, power supply, components and materials.
7.2 Complete circuit according to circuit diagram for forward bias.
7.3 Check all connections.
7.4 Measure forward bias and corresponding forward current.
7.5 Record results in tabular form.
7.6 Connect circuit according to circuit diagram of reverse bias.
7.7 Measure reverse bias and corresponding reverse current.
7.8 Record results in tabular form.
7.9 Sketch the curves form data.

8 Show skill in sketching waves of half wave rectifier circuit.

8.1 Select meter, component, oscilloscope and materials.
8.2 Complete circuit of a half wave rectifier according to circuit diagram.
8.3 Check the circuit before operation.
8.4 Measure the input and output voltage and observe wave shapes in the oscilloscope.
8.5 Sketch the output voltage wave shape.

9 Show skill in sketching waves of full wave center tapped rectifier circuit.

9.1 Select meter, component, oscilloscope and materials.
9.2 Complete a full wave rectifier circuit according to circuit diagram.
9.3 Check the circuit supply & polarity of supply.
9.4 Measure the input & output voltages and observe wave shapes in the oscilloscope.
9.5 Sketch the output voltage wave shape.
9.6 Compare the result with half-wave rectifier circuit.

10 Show skill in constructing full wave bridge rectifier.

10.1 Select meter, component, oscilloscope and materials.
10.2 Build the circuit according to the circuit diagram.
10.3 Check the circuit.
10.4 Measure the input and output voltage.
10.5 Observe wave shape.
10.6 Compare the result with other rectifiers.

11 Show skill in identifying the bipolar junction transistor.

11.1 Select pnp & npn bipolar junction transistors.
11.2 Take DMM and manufacture's literature of transistor.
11.3 Identify transistor legs.
11.4 Measure base-emitter, base-collector, forward and reverse resistance.
11.5 Determine the specifications with help of manufacturer's literatures.
11.6 Identify pnp & npn transistor.

12 Show skill in determining input and output characteristics of a transistor in common emitter connection.

12.1 Select component, AVO meters, circuit board and required materials.
12.2 Construct the circuit.
12.3 Adjust the biasing voltage to appropriate point.
12.4 Record input and output voltage and current.
12.5 Plot the curve with recorded data.

13 Show skill in testing special diodes.

13.1 Select different types of special diodes.
13.2 Set the AVO meter in the ohm scale.
13.3 Measure resistances for each of two terminals.
13.4 Determine the condition (good and bad).
13.5 Determine the different terminals.

14 Verify the truth tables of different types of logic gates.

14.1 Select the specific gate.
14.2 Prepare the experimental circuit.
14.3 Adjust the power supply.
14.4 Verify the truth table.

REFERENCE BOOKS :

1. A Text Book of Applied Electronics - R.S. SEDHA
2. Principles of Electronics - V. K. Mehta
3. Basic Electronics (Solid Stater) - B. L. Theraja
4. Electronic Devices and Circuit Theory - ROBERT BOYLESTAD
   - LOUIS NASHELSKY

6632	Computer Application -II	T	P	C
		0	6	2

OBJECTIVES

To develop skill on **S**preadsheet applications.
To develop skill on creating graphs.
To assist in the efficient use of database packages.
To develop skill on computerized database management.
To develop skill on programming with database management.

SHORT DESCRIPTION

Spreadsheet Analysis Package: Applications of spreadsheet; Using worksheet; Apply formula and functions in worksheet; Creating & printing graphs; Create simple macros.

Database management package: Creating the database; Editing the database; Searching the records; Customizing the data entry form; Creating the query; Arranging the records; Generating reports.

Database management language: Creating a command file; Writing simple database program using decision-making commands.

DETAIL DESCRIPTION

SPREAD SHEET ANALYSIS PACKAGE:

1 Apply the basic skills of a spreadsheet software package

1.1 Run a spreadsheet software package.
1.2 Identify and use different areas (working area, border area, control panel, mode indicator, and status indicator) of the worksheet screen.
1.3 Identify the function of different keys (typing key, calculator key, text key, cursor key, etc.)of the keyboard.
1.4 Move around the worksheet using keys and combination of key.
1.5 Identify and use the on-screen help facility.
1.6 Identify and use the types of data, numbers, labels and formula.
1.7 Demonstrate menus, submenus, pop-up menu, etc.

2 Manage workbooks and windows.

2.1 Make and use workbooks.
2.2 Access different types of files.
2.3 Open files as read only.
2.4 Demonstrate the options for saving files.
2.5 Display a workbook in more than one window.
2.6 Work with more one workbook.
2.7 Close a workbook.

3 Create a worksheet and use simple commands.

3.1 Activate entries in a worksheet.
3.2 Use edit key (F2) to correct or to modify entries.
3.3 Activate the command menus and select commands.
3.4 Save the worksheet.
3.5 Exit from spreadsheet .
3.6 Retrieve a previously saved worksheet.
3.7 Modify the worksheet.
3.8 Save a modified worksheet.

4 Apply formula, function and using templates.

4.1 Use simple formulae to solve arithmetical computation.
4.2 Use arithmetical operators in formula.
4.3 Edit formula.
4.4 Use mathematical function to solve simple equations.
4.5 Make and use workbook templates.
4.6 Make changes in existing workbook templates
4.7 Validate numbers, dates, times & text.
4.8 Show custom validation.

5 Solve engineering problems using formula and functions

5.1 Use mathematical functions to compute trigonometric values, absolute values, random number, square root, logarithmic values, etc for solving engineering problems.
5.2 Use logical functions to perform an operation depending on a condition in engineering problem.
5.3 Use statistical function to compute summation, average, minimum value, maximum value, etc in engineering problem.

6 Work with cell pointer to a particular cell.

6.1 Use GOTO key to move the cell pointer to particular cell.
6.2 Use the ABSOLUTE KEY to change cell address from one from to another in formula or in functions.
6.3 Enter range in formulae or in functions by typing directly or by using cell pointer.
6.4 Create a range name.
6.5 Use range name in formula & functions.
6.6 Copy, Move & Erase cell range.

7 Format a worksheet.

7.1 Change the width of a column, a range of column, and change the columns width globally.
7.2 Insert blank columns and blank rows in a worksheet.
7.3 Delete columns and blank rows in a worksheet.
7.4 Format the display of data of a worksheet globally or by referring a range of cells (e.g. currency format, exponential format, comma format, etc.).
7.5 Format the display of data and of a worksheet globally or referring of cells.
7.6 Protect worksheet, function, formula, important text and unprotect a range for entering entries.

7.7 Work with window for viewing worksheet in different ways and freeze rows or columns.
7.8 Create, change and delete a style.

8 Exercise on Sorting, Searching and Worksheet Printing.

8.1 Create a database program
8.2 Sort a database in different ways.
8.3 Search a record from the database using search criteria.
8.4 Extract records from the database that match a given criteria.
8.5 Delete records that a given criteria from the database using available database commands.
8.6 Show the Print Preview and adjust Page setup option.
8.7 Create and use page headers of footers.
8.8 Set print area, print titles and different print option
8.9 Print portion of worksheet and multiple worksheets
8.10 Print ranges from different worksheets on the same pages.

9 Create and Print graphs.

9.1 Create bar, line, X-Y and pie graphs.
9.2 Add color, titles, legend, gird and levels to the graph.
9.3 Add visual impact with colors.
9.4 Create linked pictures.
9.5 Save the graph and assign names to different graphs of a single worksheet.
9.6 Print graphs (low or high quality graphs.)
9.7 Plot graphs using a plotter using different colors.
9.8 Change graphs size, print & plot them.

10 Create Macros and using macro commands.

10.1 Create simple macros (e.g. to change the width of a cell, to format a cell display, to erase a range of cells etc.) using keystroke commands.
10.2 Create a macro to convert values into labels vice versa.
10.3 Create a macro for inserting blank rows between two rows of data in a worksheet.
10.4 Create a macro for deleting the inserted blank rows in a worksheet.

DATABASE MANAGEMENT PACKAGE:

11 Create the new database.

11.1 Identify the practical database in real world.
11.2 Identify the fields and records of a database.
11.3 Identify the different phases of database design.
11.4 Collect the data form a typical field.

11.5 Determine the category of a typical field.
11.6 Design a typical Paper- pencil database form raw data.
11.7 Run a generalized database management package and identify its display Screen
11.8 Identify the different options of the selected packages.
11.9 Use the on-screen help facilities of DBMS package
11.10 Create and save the table structure.

12 Change the table structure and edit database.

12.1 Modify and Edit the table structure.
12.2 Verify the structure (i.e. data of update, number of records. etc)
12.3 Enter or append the new records in the database.
12.4 Use the key combinations for editing.
12.5 Use the available options to edit fields.
12.6 Delete unwanted records and files.
12.7 Save & close database file.
12.8 Use different modes to append and edit records of database.

13 Search, display and arrange the records of database.

13.1 View a database using list and display command
13.2 Retrieve the database records with different conditions.
13.3 Search within a field.
13.4 Keep the track of specific records.
13.5 Keep the database up-to-date.
13.6 Sort a database on single or multiple fields.
13.7 Sort with qualifier (i.e. sort with specific subset of records).
13.8 Index the database on single or multiple fields.
13.9 Use the function to index on different field types.
13.10 Use the commands for selective indexing and to control the order of records.

14 Create the customized data entry form.

14.1 Draw a typical data entry screen with paper-pencil work.
14.2 Design the screen with all fields.
14.3 Move the field to make the entry form logical and easy to use.
14.4 Change the field width.
14.5 Add or delete field (if necessary).
14.6 Change the display characteristics of fields.
14.7 Use picture functions template and range to format the displayed data.
14.8 Use different options and commands in design menu.
14.9 Draw lines and boxes on the form.

15 Create the query.

15.1 Display and identify query design screen.
15.2 Build a simple query
15.3 Save & apply the query.
15.4 Use the query design menu options.
15.5 Use the symbols and operators to build query.

15.6 Search the records with matching on two or more fields.
15.7 Select the records within range using range operators.
15.8 Find the records with inexact and complex matching.
15.9 Sort the records within queries.

16 Generate the custom reports.

16.1 Send the reports to the screen or to a file.
16.2 Use the print menu options and dos-prompt options.
16.3 Produce a quick and selective report.
16.4 Plan the design of the report.
16.5 Design a custom columnar report.
16.6 Find the parts of a report specification.
16.7 Make the changes to the report specification.
16.8 Save & run the report.

17 Work with multiple database and relationship.

17.1 Merge the data form one file to another.
17.2 View the files to relate two or more database files.
17.3 Set up the relationship.
17.4 Modify the relationship.
17.5 Create the report from relational database.

DATABASE MANAGEMENT LANGUAGE:

18 Create a simple command file using expression and function.

18.1 Identify the database editor.
18.2 Use the commands to assign different types of data values to variables.
18.3 Save the memory variable.
18.4 Display the memory variable.
18.5 Release & restore the memory variable.
18.6 Use the mathematical expression.
18.7 Use the mathematical, relational, logical and string operators.
18.8 Use the common function such as EOF, BOF DATE, UPPER & LOWER< CTOD, DTOS, SPACE, TRIM, STR, etc. in command file.
18.9 Use the commonly use commands such as SET TALK, SKIP, RETURN in command file.
18.10 Use the commands to display a string of characters and wait for user response.
18.11 Use commands to display or print text.

19 Design & write simple programs.

19.1 Identify the basic steps to design a program.
19.2 Write the pseudocode for simple program.
19.3 Convert the pseudocode into actual program code.
19.4 Verify & documents the simple program.
19.5 Save the command file and then exit.
19.6 Run the program.

20 Use the decision making commands in Programs.

20.1 Use DO WHILE ---- ENDDO, IF ---- ENDIF and DO CASE ---- ENDCASE to control program flow.
20.2 Use SCAN ---- ENDSCAN command instead of DO WHILE ---- ENDDO.
20.3 Use IF, ELSE and ENDIF commands to branch to the part the program.
20.4 Use nested IF ---- ENDIF statements.
20.5 Write simple program using decision making commands.
20.6 Use immediate IF function.
20.7 Write simple program using immediate IF function.
20.8 Use CASE ---- ENDCASE statement instead more than three IF ---- ENDIF statements.
20.9 Use the EXIT, CANCEL, WAIT and ZAP command in database program.
20.10 Use macro function within programs.

6431 CIVIL ENGINEERING DRAWING (CAD)-I	T	P	C
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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 STORID 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 slopped 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

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:
i) $x^2 + y^2 = a^2$
ii) $(x - h)^2 + (y - k)^2 = a^2$
iii) $x^2 + y^2 + 2gx + 2fy + c = 0$
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) $\lim_{x \to 0} \frac{\sin x}{x} = 1$

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

9. Understand differential co-efficient and differentiation.

9.1 Define differential co-efficient in the form of

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

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

5922	PHYSICS–II	T	P	C
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AIMS

- To provide a foundation in scientific principles and processes for the understanding and application of technology.
- To develop an understanding of fundamental scientific concepts through investigation and experimentation.
- To provide a common base for further studies in technology and science.
- To develop the basic knowledge of modern physics.

Short description

Thermometry; Calorimetry, Expansion of materials (effect of heat); Heat transfer; Nature of heat and its mechanical equivalent; Engine.
Principles of light and Photometry; Reflection of light; Refraction of light ; lens.
Concept of Electron and photon; structure of atom, Theory of Relativity.

Detail description

Theory :

1. Thermometry

1.1 Define heat and temperature.
1.2 Mention the units of measurement of heat and temperature.
1.3 Distinguish between heat and temperature.
1.4 Identify the sources of heat.
1.5 Identify the range of the Celsius scale determined by the boiling point and melting point of water
1.6 Compare the Celsius scale, Roamer scale, Fahrenheit scale, Kelvin scale and Rankin scale of temperature measurement.
1.7 State the construction and graduation of a mercury thermometer.
1.8 Describe the operation of different types of thermometers (e.g., maximum and minimum thermometer, clinical thermometer).

2. Heat capacity of materials (calorimetric)

2.1 State the heat as a form of energy.
2.2 Define specific heat capacity.
2.3 State SI units of measurement of specific heat capacity as J/Kgc^0 or J/Kgk^0.
2.4 Define thermal capacity and water equivalent.
2.5 Differentiate between thermal capacity and water equivalent.
2.6 Mention the specific heat capacity of different materials.

2.7 Prove the total heat gained by an object is equal to the sum of the heat lost by all the surrounding objects.

2.8.1 Identify specific latent heat as the energy consumed or liberated when water vaporizes or condenses and when ice melts or freezes.

2.8.2 Explain the effects of a change in pressure on the melting point and boiling point of water.

2.9 Define various kinds of specific latent heat.

2.9.1 Determine the latent heat of fusion of ice and latent heat of vaporization of water.

3. Effects of heat on dimension of materials

3.1 Show that different materials change in size at different amounts with the same heat source.

3.2 Explain the meaning of differential expansion in bimetallic strip, thermostats, compensated pendulum etc.

3.3 Explain the methods of overcoming problems caused by the expansion of materials in buildings, machinery, railway lines and bridges.

3.4 Define the co-efficient of linear, superficial and cubical expansion of solids.

3.5 Mention the units co-efficient of linear, superficial and cubical expansion of solids.

3.6 Mention the linear, Superficial and cubical expansion of a range of common engineering materials.

3.7 Define real and apparent expansion of liquid.

3.8 Define and explain the co-efficient of real and apparent expansion of liquid.

3.9 Distinguish between the co-efficient of real and apparent expansion of liquid.

3.10 Determine the co-efficient of real and apparent expansion of liquid.

4. Heat transfer

4.1 Identify the phenomenon of heat transferring from hot bodies to cold bodies.

4.2 Explain the methods of heat transfer by conduction, convection and radiation with examples of each type of transfer.

4.3 Define thermal conductivity (K) & rate of heat transfer.

State the SI units of thermal conductivity as $\frac{w}{mk}$ or $\frac{w}{mc}$

4.4 List the factors which determine the quantity of heat (Q) flowing through a material.

4.5 Show that the quantity of heat flowing through a material can be found from $Q = \frac{KA\,(\theta_H - \theta_C)t}{d}$

4.6 Outline the properties of materials which give thermal insulation.

4.7 Explain Characteristics of radiant heat energy.

4.8 Describe Emissive power and absorptive power of radiant heat.

4.9 State Stefan-Boltzman Law,
4.10 State Newton's law of cooling.
4.11 State wiens law.
4.12 Explain Green house effect.

5. Nature of heat and its mechanical equivalent

5.1 Describe the caloric theory and kinetic theory of heat.
5.2 State the drawbacks of the caloric theory of heat.
5.3 Explain the mechanical equivalent of heat.
5.4 Explain the first law of thermodynamics .
5.5 Explain Isothermal and adiabatic change.
5.6 Explain Specific heat of a gas, Molar specific heat or molar heat capacity.
5.7 Relate between pressure and volume of a gas in adiabatic Change i, e;$PV\gamma$=const.
5.8 Difference between C_P and C_v for an ideal gas (C_P-C_v=R)

6. 2nd law of thermodynamics

6.1 State and Explain Reversible process and irreversible process.
6.2 State & explain 2nd law of thermodynamics
6.3 Explain heat engine.
6.4 Explain the principle of work of a heat engine.
6.5 Identify thermal efficiency of a heat engine.
6.6 Explain the working principles of internal combustion and external combustion engines (with fair sketches)
6.7 Distinguish between internal combustion engine and external combustion engine. Entropy : Definition, unit and significant.
6.8 Explain Change of entropy in a reversible and irreversible process.
6.9 Give an example of increase of entropy in irreversible process.

7. Preliminaries of light and photometry

7.1 Define light, medium (transparent, translucent, opaque), luminous & non-luminous bodies, parallel, convergent & divergent rays, beam.
7.2 Show the travel of light in straight line.
7.3 Define photometry, luminous intensity, luminous flux, brightness and illuminating power.
7.4 Mention the units of luminous intensity, luminous flux, brightness and illuminating power.
7.5 Mention relation between luminous intensity & illuminating power.
7.6 Explain inverse square law of light.
7.7 Describe the practical uses of light waves in engineering.

8. Reflection of light

8.1 Define mirror (plane & spherical), image (real & virtual) and magnification of images.
8.2 Describe the reflection of light.
8.3 State the laws of reflection of light.
8.4 Express the verification of laws of reflection.
8.5 Define pole, principal axis, center of curvature, radius of curvature, principal focus in case of concave & convex mirrors.
8.6 Find the relation between focal length & radius of curvature of a concave & convex mirror.
8.7 Express the general equation of concave and convex mirror.

9. refraction of light

9.1 Define refraction of light Give examples of refraction of light
9.2 State the laws of refraction and Express the verification of laws of refraction
9.3 Define absolute and relative refractive index and Relate absolute and relative refractive index
9.4 Explain the meaning of total internal reflection and critical angle and Relate total internal reflection and critical angle.
9.5 Give examples of total internal reflection.
9.6 Describe refraction of light through a prism.
9.7 Express the deduction of the relation between refractive index, minimum deviation and angle of the prism.
9.8 Explain Dispersion of light.
9.9 Define lens and mention the kinds of lens.
9.10 Define center of curvature, radius of curvature, principal axis, 1_{st} and 2_{nd} Principal focus, optical center and power of lens.
9.11 Express the deduction of the general equation of lens (eoncave & convex).
9.12 Define Combination of two thin lenses and equivalent lens.
9.13 Identify and List uses of lens.

10. Electron and photon :

10.1 Describe Electrical conductivity of gases.
10.2 Describe Discharge tube.
10.3 Cathode ray : Definition and its properties
10.4 X-ray : Definition, properties & uses
10.5 Discuss Photo electric effect .
10.6 Derive Einstein's photo electric equation

11. Structure of atom :

11.1 Atomic models : Thomson, Rutherford and Bohr model.
11.2 Bohr Hydrogen atom & the theory of hydrogen spectra .
11.3 Define and explain Radio activity.
11.4 Describe Radio active rays.
11.5 Deduce radioactive decay law.
11.6 Define half-life & mean life of radioactive atoms.
11.7 Define nuclear fission & fusion.

12. Theory of relativity :

12.1 Express the theory of relativity.
12.2 Mention different Kinds of theory of relativity.
12.3 Explain special theory of relativity and its fundamental postulate.
12.4 Deduce Einstein's mass -energy relation

Practical:

1. Compare the operation of common thermometers.
2. Determine the co-efficient of linear expansion of a solid by Pullinger's apparatus.
3. Measure the specific heat capacity of various substances.(Brass, steel).
4. Determine the latent heat of fusion of ice.
5. Determine the water equivalent by calorimeter.
6. Compare the luminous intensity of two different light sources.
7. Verify the laws of reflection.
8. Find out the focal length of a concave mirror.
9. Determine the refractive index of a glass Slab.
10. Determine the angle of Minimum deviation and refractive index of a glass prism by using I-D graph.

5811	Social science- I	T	P	C
		2	0	2

OBJECTIVES

To provide opportunity to acquire knowledge and understanding on :
- importance of civics and its relationship with other social sciences
- the relationship of an individual with other individuals in a society
- social organizations, state and government
- rule of law, public opinion and political parties
- UNO and its roles
- the basic concepts and principles of economics and human endeavor in the economic system.
- the realities of Bangladesh economy and the current problems confronting the country.
- the role of Diploma Engineers in industries.
- occupations and career planning for Diploma Enginers.

SHORT DESCRIPTION

Civics and Social Sciences; Individual and Society; Nation and Nationality; Citizenship; state and government; Law; Constitution; Government and its organs; public Opinion; Political Party; UNO and its organs;

Scope and importance of Economics; Basic concepts of Economics- Utility, Wealth, consunmption, income wages and salary and savings; Production – meaning, nature, factors and laws; Demand and Supply; Current economic problems of Bangladesh; Role of Diploma Engineers in the economic development of Bangladesh; Occupations and career planning; Engineering teem.

Part-1 (Civics)

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

2. Understand the relationship of the individual with the society, Nationality and nation, Rights and duties of a citizen.
   - 2.1 Define the concept (individual, society, Nation, Nationality, citizen and citizenship).
   - 2.2 State the relationship among the individuals in the society.
   - 2.3 Differentiate between nation and nationality.
   - 2.4 Describe the elements of nationality

2.5 Describe the criteria of Bangladesh nationalism.
2.6 Diferentiate between a citizen and an alien.
2.7 Discuss the methods of acquiring citizenship and state the causes of losing citizenship
2.8 Describe the rights of a citizen and state the need for developing good citizenship.

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

4. Understand and the classification of constitution
   4.1 Explain the deferent form of Constitution
   4.2 Explain the merits and demerits of different forms of constitution and state the salient feature of Bangladesh constitution

5. Understand the importance of the formation of public opinion and the role of political parties in the affairs of state and government.
   5.1 Define the public Opinion and political party.
   5.2 Explain the importance of public opinion in the modern democratic society.
   5.3 Discuss the role of different media in forming public opinion.
   5.4 Discuss the importance of political parties in democracy.

6. Understand the role of UNO in maintaining world peace
   6.1 Explain the major functions of UNO.
   6.2 State the composition and functions of General Assembly.
   6.3 Describe the Composition and functions of security council.
   6.4 Discuss the role of Bangladesh in the UNO.

Part-2 (Economics)

1. Understand the importance of the study fundamental concepts of economics.
    - 1.1 Discuss the definition of Economics as given by eminent economists.
    - 1.2 Describe the scope and importance of economics of Technical Student.
    - 1.3 Define commodity, utility, value, wealth, consumption, income, savings wages and salary.
    - 1.4 Differentiate between value in use and value in exchange.
    - 1.5 Explain wealth with its characteristics.

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

3. Appreciate the importance of the concept of elasticity of demand.
    - 3.1 Illustrate the law of diminishing utility.
    - 3.2 Define the marginal utility explain the law of dimishing marginal utility.
    - 3.3 define the term, “demand”
    - 3.4 Describe elasticity of demand and factors which determine the elasticity of demand
    - 3.5 Describe elasticity of supply with the help a supply curve.

4. Understand national income and population control.
    - 4.1 Explain national income.
    - 4.2 Discuss GDP and GNP.
    - 4.3 Discuss growth rates.
    - 4.4 Explain features of Bangladesh population.
    - 4.5 State measures to be undertaken to arrest high growth rate of population.

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

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

7. Appreciate the career prospects for Diploma Engineers in different production/service engineering organizations.
   - 7.1 Explain the employment opportunities for diploma engineers in different sectors and sub Sectors of economy
   - 7.2 Explain socio-economic status of a diploma Engineer.
   - 7.3 Explain prospects of diploma Engineers in self-employment.

5722 **ENGLISH – II** **T** **P** **C**
2 2 3

OBJECTIVES :

After the completion of the course, learners will be able to develop-

* Reading and writing skills
* Grammatical accuracy with emphasis on spelling & punctuation
* Information Collection
* Creative Writing
* Effective Communication and Correspondence

CONTENTS

Seen comprehension *Marks 20*

Fourteen: Human Resources	3	Enriching the workforce
Sixteen: Wonders Home and Abroad	1	The Sangsad Bhaban
	2	The Jamuna Multi-Purpose Bridge
Seventeen: Modes of Communication	6	E-mail
Nineteen : Healthy Living	5	The disabled among us
Twenty: Jobs and Professions	2	How can I be self-employed?
	3	Self-help a key to success
Twenty-one: Globalization	1	The world as a global village
	3	Modern technology and globalization
	6	Globalization and English

N.B: The Unit mentioned refers to the Text Book (1st Paper) English for Today for class 11 – 12 by National Curriculum & Text Book Board, Dhaka.

GRAMMAR *Marks 30*

Unit	Lesson	Title
One: Pronouns & Determiners	3	Modifier: Pick out modifiers, determiners, Infinitive, participles headword, in the sentence. Question : A beautiful girl of Thirteen dances well. : Headword: girl Pre modifier – a, beautiful Post modifier – of thirteen

Twelve: Further Use of Preposition	2	Use Appropriate Prepositions
Patterns of Sentence Structure		3. Sentence Structure ---------- Question a) Analyse sentences Exam : He goes to school. Ans: Sub : He Verb intransitive: goes b) Make Sentence according to the structure Question $S+V_I+Ob_i+Ob_2$ Answer : He called me a liar.
Fourteen: Idiom and Phrase	9	Make Sentences with the idioms and Phrases in the following. (any five)
Changing Speech		Direct & indirect narration

N.B: The Unit mentioned refers to the Text Book (2nd Paper) English Grammar and Composition for class XI - XII by National Curriculum & Text Book Board, Dhaka.

COMPOSITION marks 30

Area of interest: With hints/ key words
National, Social, Political Problems: Terrorism, Drug Addiction, Acid Violence, Dowry, Load shedding, Price Hike, Gender Discrimination, Traffic Jam, Deforestation etc.

Calamities: Drought, Erosion, Flood, Cyclone, Earth quake, Landslide etc.

National days and festivals: International Mother Language Day, Independence Day, Victory Day, Pahela Baishakh, May Day etc.

Scientific Development: Satellite, Optical Fiber, E-mail, Internet & Agricultural Development.

Environment Pollution: Water, Air, Sound, Global Warming.

Heritage sites: The Sundarbans, National Memorial, Cox's Bazar Sea Beach, Bhashani Novo Theatre.

Industries: Garments, Textile, Poultry, Leather, Ceramics, Fertilizer.

1. Writing a short composition
2. Writing a formal letter/CV.
3. Writing Letter (Personal/Official)

4. Writing Reports on work place of standard form/ instrument or Construction or fault on / instrument or Construction/ Repairing of instrument or Construction/ a situtation/event/incident.
5. Writing letter to the print & Electronic media.

Practical

1. Asking Questions : WH, Yes/No, Tag questions
2. Conversations on real life situations
   a) Today's market price
   b) About festival
   c) Preparation for the examination
   d) Last day of your Class.
   e) Visit to the place of interest
   f) Choice of profession
   g) Current Topics from Newspapers.

BANGLADESH TECHNICAL EDUCATION BOARD

4-YEAR DIPLOMA-IN-ENGINEERING PROGRAM

ENVIRONMENTAL TECHNOLOGY

SYLLABUS

FORTH SEMESTER

9041 NATURAL RESOURCES AND THEIR CONSERVATION

T	*P*	*C*
2	**0**	**2**

11 AIMS

- To be able to understand the natural resources of Bangladesh.
- To be able to understand soil resources, forest and wild life resources, water resources, fish resources, mineral resources, energy resources and agricultural crop, conservation of natural resources of Bangladesh.

SHORT DESCRIPTION

Natural resources; Soil resources of Bangladesh; Forest and Wildlife resources of Bangladesh; Water resources of Bangladesh; Fish and livestock of Bangladesh; Mineral resources of Bangladesh; Agricultural crops of Bangladesh; Renewable and non-renewable conventional and non-conventional Energy resources in Bangladesh; Biodiversity of Bangladesh; Conservation of natural resources.

DETAIL DESCRIPTION

1. Understand the natural resources.

1.1 Define resources.

1.2 Describe the natural resources.

1.3 Mention the classification of natural resources.

1.4 Describe the natural resources of Bangladesh.

2. Understand the soil resources of Bangladesh.

2.1 Define soil resources.

2.2 Mention the classification of soil resources of Bangladesh.

2.3 Describe the flood plain of Bangladesh.

2.4 Describe the terrace of Bangladesh.

2.5 Describe the hills of Bangladesh.

2.6 Describe the coral reef island of Bangladesh.

2.7 Describe the agro-ecological zones of Bangladesh.

3. Understand the forest resources of Bangladesh.

3.1 Define forest resources.

3.2 Mention the classification of forest resources of Bangladesh.

3.3 Describe the tropical evergreen forest of Bangladesh.

3.4 Describe the mangrove forest of Bangladesh.

3.5 Define wildlife.

3.6 Describe the wildlife of Bangladesh.

4. Understand the water resources of Bangladesh.

4.1 Define water resources.

4.2 Describe the water resources of Bangladesh.

4.3 Describe the river morphology in Bangladesh.

4.4 Describe the wetland resources of Bangladesh.

4.5 Describe the coastal resources of Bangladesh.

5. Understand the agro-based resources of Bangladesh.

5.1 List the main agricultural resources of Bangladesh.

5.2 Describe the main food crops of Bangladesh.

5.3 Describe the main cash crops of Bangladesh.

5.4 Describe the fish resources of Bangladesh.

5.5 List the aquacultural and silvicultural resources of Bangladesh.

5.6 Describe the livestock resources of Bangladesh.

6. Understand the non-renewable mineral resources of Bangladesh.

6.1 Define nonrenewable mineral resources.

6.2 Mention the classification of nonrenewable mineral resource of Bangladesh.

6.3 Describe the natural gas and oil of Bangladesh.

6.4 Describe the coal and peat of Bangladesh.

6.5 Describe the limestone, hardrock, metallic minerals, stone, construction sand, gravel and glass sand resources of Bangladesh.

6.6 Describe the white clay and brick clay of Bangladesh.

7. Understand the renewable and non-renewable conventional energy resource of Bangladesh.

7.1 List the renewable and non-renewable conventional energy resources.

7.2 Describe the difference between renewable and non-renewable conventional energy resource.

7.3 Describe the hydro-electricity as a renewable energy resource.

7.4 Describe renewable and non-renewable of gaseous fuel.

7.5 Describe the use of coal in thermal power station.

7.6 Explain why natural gas is a non-renewable energy resource.

7.7 Describe the sources and production of natural gas.

7.8 Describe the effective use of conventional energy resources on environment.

8. Understand the renewable and non-conventional energy resource of Bangladesh.

8.1 List the renewable and non-renewable non-conventional energy resources.

8.2 Define solar energy and solar electricity.

8.3 Describe the construction mechanism of solar photo voltage cell.

8.4 Mention the uses of solar energy and solar electricity.

8.5 Define wind energy, biofuel and biogas.

8.6 Describe the sources of biogas.

8.7 Describe the method of biogas production plant.

8.8 Describe the method of production of electricity for wind energy.

8.9 Describe the uses of biogas and its effects on environment.

9. Understand the biodiversity of Bangladesh.

9.1 Define biodiversity

9.2 Mention the types of biodiversity.

9.3 Describe the bio-diversity in Bangladesh.

9.4 Describe the plant diversity in Bangladesh.

9.5 Describe animal diversity in Bangladesh.

9.6 Describe genetic diversity and ecological diversity.

9.7 Describe endangered flora and fauna of Bangladesh.

10. Understand the conservation of natural resources.

10.1 Define conservation, endanger species, threatend species, extinct species, rear species.

10.2 Mention the natural resources conservation organization in Bangladesh.

10.3 Describe in-situ conservation and ex-situ conservation.

10.4 Describe the soil conservation.

10.5 Describe the conservation of water resources of Bangladesh.

10.6 Describe the conservation fish resources of Bangladesh.

10.7 Status of biodiversity conservation in Bangladesh: Agenda 21 (Convention on biodiversity).

10.8 Describe the sanctuary, National park, world heritage site, ramsar site, ecological critical area and other protected areas in Bangladesh.

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2. Reza, A.H.M.A. (2004) Natural Resources Management in Bangladesh: Linking National Pririty to Global Perspective, Tigrepaper Vol. 31:No. 2 Apr-Jun, p10-16.
3. Peavy, Rome and Tchobanoglom (1985) Environmental Engineering, McGraw Hill Hill Book Company, New York.
4. Gearil Kiely; Environmental Engineering.

9042 ENVIRONMENTAL CHEMISTRY

T	P	C
3	3	4

AIMS

The overall goal of this course is to gain an understanding of the fundamental chemical processes that are central to a range of important environmental problems and to utilize this knowledge in making critical evaluations of these problems. Specific goals include gaining:

- An understanding of the chemistry of the cycle of natural elements.
- An understanding of the chemistry of the atmospheric processes.
- An understanding of the chemistry of photochemical smog, greenhouse effect, ozone layer depletion and acid precipitation.
- An understanding the nature, reactivity, and environmental fates of toxic chemicals.
- An understanding of the chemistry of natural waters and of their pollution and purification.
- An understanding of the biochemistry that occurred within organisms.

SHORT DESCRIPTION

Basic concept of environmental chemistry; Structure and chemistry atmosphere; Chemical and photochemical reactions in the atmosphere; Green house effect and Global warming; Chemistry of hydrosphere; Chemistry of lithosphere; Biochemical effects of carbon, nitrogen oxide, sulpher dioxide, cyanide and pesticides; Chemistry of lithosphere;

Chemical toxicology; Chemistry of air pollution; Chemistry of water pollution and treatment; Basic concept from organic chemistry; Basic concept from bio-chemistry and bioenergetics and metabolism.

DETAIL DESCRIPTION

1. **Understand the basic concepts of environmental chemistry**
   - 1.1. Define environmental chemistry
   - 1.2. Describe the concept and scope of environmental chemistry
   - 1.3. Illustrate the natural cycles of the environment
2. **Understand the basic concepts of atmospheric chemistry**
   - 2.1. Describe the atmospheric structure
   - 2.2. Illustrate the earth's radiation balance
   - 2.3. Describe the particles, ions and radicals in the atmosphere
   - 2.4. Describe the chemical processes related to inorganic particulate matter
   - 2.5. Describe the chemical processes related to organic particulate matter
   - 2.6. Describe oxygen and ozone chemistry
   - 2.7. Describe chemistry of carbon and oxygen
   - 2.8. Describe major sources and sinks of carbon dioxide
   - 2.9. Describe the reaction of sulfur dioxide
   - 2.10. Describe the reaction of nitrogen oxides
   - 2.11. Describe the reaction of organic compounds
3. **Understand the chemistry of air pollution**

3.1. Describe air pollutants

3.2. Describe chemistry of hydrocarbons and photochemical smog

3.3. Describe greenhouse effect and global warming

3.4. Describe stratospheric ozone depletion

3.5. Describe chemistry related to acid rain

3.6. Describe El Nino

3.7. Describe the effects of atmospheric pollution

3.8. Describe indoor reactions of air pollutants

4. Understand the chemistry of hydrosphere

4.1. Describe the water resources

4.2. Describe the physical chemistry of sea water

4.3. Describe alkalinity of water

4.4. Describe source and nature of acidity

4.5. Describe cause and source of hardness

4.6. Describe complexation in natural water and waste water

4.7. Describe micro-organisms – the catalysts of aquatic chemical reactions

5. Understand the chemistry of water pollution and treatment

5.1. Describe aquatic environment

5.2. Describe water pollutants

5.3. Describe the organic pollution of water.

5.4. Describe the inorganic pollutants of water.

5.5. Describe the sediments in water.

5.6. Describe the radioactive materials in water.

5.7. Describe eutrophication

5.8. Describe oxygen sag curve

5.9. Describe chemistry of domestic waste water treatment

5.10. Describe chemistry of aerobic treatment process

5.11. Describe chemistry of anaerobic treatment process

5.12. Describe chemistry of upflow anaerobic sludge bed reactor process

5.13. Describe chemistry of industrial waste water treatment

5.14. Describe chemistry of trace metal in water

6. Understand the chemistry of lithosphere

6.1. Describe the composition of lithosphere

6.2. Describe inorganic and organic components in soil

6.3. Describe acid-base and ion-exchange reactions in soils

6.4. Describe micro and macro-nutrients

6.5. Describe waste and pollutants in soil

6.6. Describe heavy metals in soil

6.7. Describe agricultural chemicals in soil

7. Understand the concept of chemical toxicology

7.1. Describe toxic chemicals in the environment

7.2. Describe impact of toxic chemicals of enzymes

7.3. Describe biochemical effects of arsenic

7.4. Describe biochemical effects of cadmium

7.5. Describe biochemical effects of lead

7.6. Describe biochemical effects of mercury

7.7. Describe carcinogens

7.8. Describe biochemical effects of pesticides

7.9. Describe health in disease related to toxicology.

8. Understand the basic concept from organic chemistry

8.1. Define organic chemistry

8.2. Describe the importance of organic chemistry

8.3. Describe the properties of organic compounds

8.4. Describe the sources of organic compounds

8.5. List some important functional group of organic compounds with example.

8.6. Describe synthetic organic pollutants

8.7. Define simple lipids

8.8. Describe the classification of lipids

8.9. Define fats, oils and waxes

8.10. Describe properties of lipids

8.11. Define soaps and detergents

8.12. Describe classification of soaps

8.13. Describe composition of detergents

8.14. describe classification of detergents

8.15. Describe water pollution mechanism of detergents

8.16. Describe oxidation and reduction of organics with examples

9. Understand the basic concept from environmental biochemistry

9.1. Define biochemistry

9.2. Describe structure and functions of cell constituents

9.3. Define amino acids

9.4. Describe common properties of amino acids

9.5. Define peptides

9.6. Describe primary structure of peptides

9.7. Define protein

9.8. Describe classification of proteins

9.9. List major types of protein with their functions

9.10. Describe denaturation of proteins.

9.11. Define carbohydrate

9.12. Describe the classification of carbohydrate with example

9.13. Define lipid

9.14. Describe lipids

9.15. Define enzyme

9.16. Describe properties of enzymes

9.17. Describe the classification of enzymes

9.18. Define co-enzymes

9.19. Describe classification of co-enzymes

9.20. Describe functions of co-enzymes

9.21. Describe catalytic site of enzyme

9.22. Describe co-factors

9.23. Describe functions of co-factors

9.24. Define vitamins

9.25. List various types of vitamins with their functions

9.26. Describe nucleic acids

9.27. Describe chemistry of DNA

9.28. Describe chemistry of RNA

9.29. Describe structural organization of RNA

9.30. Describe biological importance of nucleic acids

9.31. Describe modified DNA

10. Understand the basic concept of bioenergetics and metabolism

10.1. Define bio energetics

10.2. Describe principles of bioenergetics

10.3. Describe energy relationships between catabolic and anabolic pathways

10.4. Describe energy-yielding metabolic processes

10.5. Describe CO_2 assimilation in photosynthetic organisms

10.6. Describe biodegradation

10.7. Describe distribution of fluids in the body

10.8. Describe principal mineral elements

10.9. Describe trace elements

10.10. Describe adsorption of calcium, phosphorus, magnesium, sodium, potassium, chlorine, iron, copper, zinc, manganese, molybdenum, chromium and lead

PRACTICAL

1. Determine atmospheric hydrogen sulphide.
2. Determine aromatic hydrocarbons in exhaust.
3. Measure particulate matter from air.
4. Measure dissolved oxygen by Winkler method.

5. Measure dissolved oxygen by Polarographic method.
6. Measure dissolved ammonia by Nessler's method.
7. Measure total nitrate and nitrite
8. Measure chloride
9. Measure free (residual) chlorine
10. Measure total hardness by titration with EDTA.
11. Measure silica by gravimetric method.
12. Measure Escherichia Coliform (E. coli) in a sample of drinking water.
13. Measure total coliform in a sample of drinking water
14. Determine heavy metals in water samples.

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SUBJECT CODE	ESTIMATING & COSTING -I	T	P	C
6442		3	3	4

AIMS

To provide the ability of quantity analysis of civil engineering works

To enable to estimate volume quantites of materials used in construction works

To provide understanding cost abstruct of civil engineering works

To be able to improve knowledge and skill of estimating two storied building consisting of spread footing .

To develop skill in estimating RCC and bituminous road .

To develop skill in rate analysis process for different items of work in the building trades.

SHORT DESCRIPTION

Introduction to estimating ,Quantity estimation of excavating tank, road embankment canal digging , steps, boundary wall, bituminous & Rcc road, Complete estimate of a single storied two- roomed building with verandah and Two storied building with verandah,. Rate analysis.

DETAIL DESCRIPTION

Theory

INTRODUCTION TO ESTIMATING

1 Understand the basic concept of estimating .

1.1 Define the term estimating .

1.2 State the methods of estimating .

1.3 Mention the rules and methods of measurements of works.

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

1.5 List unit weight of different materials used in construction works

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

QUANTITY ESTIMATION

2 Estimate the volume of earth work for excavating a tank

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

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

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

3 Estimate the volume of earth work for road embankment.

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

3.2 Identify the cross section of road embankment.

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

4 Estimate the volume of earth work for canal digging.

4.1 Identify the cross section of partly banking and partly cutting.
4.2 .Explain the method of finding out volume of earth work for partly banking and partly cutting.
4.3 .Explain the terms lead and lift.

5 Estimate the different quantities of item of work in steps , boundary wall and roads.

5.1 Identify different parts of a steps .
5.2 List different items of works in a boundary wall .
5.3 List different items of works in a bituminous road .
5.4 List different items of works in a RCC road.

COMPLETE ESTIMATE OF A SINGLE STORIED TWO ROOMED BUILDING WITH VERANDAH AND TWO STORIED BUILDING WITH VERANDAH.

6 Understand the procedure of estimating a simple building.

6.1 State centre line and separate wall method.
6.2 Mention the advantage and disadvantage of centre line and separate wall methods.
6.3 Explain the methods of deduction for opening or over lapping.
6.4 Define the terms sub-structure and super- structure.
6.5 .Explain the dimensions length, breadth and height or depth of any section.
6.6 Identify main wall, partition wall, outer wall, inner wall, parapet wall etc.
6.7 Identify RCC work in lintel, beam, stair, floor/roof slab, sunshade, shelve, railing, drop wall etc.
6.8 .List different sizes of doors and windows.
6.9 List the number of ventilators required.
6.10 Identify the items of work for civil construction.

RATE ANALYSIS

7 Understand the basic concept of rate analysis.

7.1 State meaning of rate analysis. .
7.2 Explain the purposes of rate analysis.
7.3 Explain the terms, contractors profit, overhead charges, contingency sundries and

lumsum.

7.4 Mention the advantage of rate analysis to prepare cost estimate .

PRACTICAL

1. Calculate the volume of earth work in excavating tank of a given cross-section by mid area method.
2. Calculate the volume of earth work in excavating tank of a given cross-section by mean area method.
3. Calculate the volume of earth work in excavating tank of a given cross-section by prismoidal method.
4. Calculate the volume of earth work of 100m long embankment by mid area method.
5. Calculate the volume of earth work of 100m long embankment by mean area method..
6. Calculate the volume of earth work of 100m long embankment by prismoidal method.
7. Determine the rate of different categories of labour cosidering the work site including lead and lift.
8. Calculate the cost of abstruct considering labour categories and lead & lifts.
9. Calculate the volume of earth work for partly banking and partly cutting.
10. Calculate the amount of cement ,sand and brick required for 10 cum masonry work using 1:4 proportion of mortar.
11. Calculate the amount of cement ,sand and brick required for 10 cum masonry work using 1:6 proportion of mortar.
12. Calculate the amount of cement ,sand and brick required for 10 sqm brick masonry (125mm thick wall) using 1:4 proportion mortar.
13. Prepare an estimate for construction of underground water reservior.
14. Prepare an estimate for construction of 100m long boundary wall.
15. Prepare an estimate for making wooden chair, table and almirah.
16. Prepare an estimate for construction of 100m long bituminous road.
17. Prepare an estimate for construction of 100m long RCC road.

18 Calculate the quantity of following items of work of a single storied two-roomed building with verandah and two storied building with verandah.

18.1 Earth work in excavation of foundation trenches.

18.2 One layer brick flat soling in foundation and floor.

18.3 Cement concrete work (1:3:6) in foundation and floor.

18.4 Brick work(1:6) in foundation (Sub-structure) up to plinth level.

18.5 Earth work in filling the sides of foundation trenches and plinth.

18.6 Damp proof course (DPC) below super structure wall.

18.7 Brick work (1:6) in super structure .

18.8 125 mm thick Brick work (1:4) in partition wall .

18.9 RCC work (1:2:4) in lintel, beams, roof slab, stair, sunshade and drop wall.

18.10 Mild steel bar reinforcement fabrication in different RCC works when percentage given .

18.11 Wood work in door and window frames.

18.12 Wood work in door and window shutters.
18.13 Grill work for windows .
18.14 Pre-cast RCC ventilator .
18.15 Cement plaster to both sides of brick wall .
18.16 Cement plaster to all RCC surface .
18.17 Cement plaster to plinth wall and skirting with neat cement finishing (NCF) .
18.18 Patent stone flooring (PSF)
18.19 Lime terracing over RCC roof slab.
18.20 White washing/distempering.
18.21 Plastic emulsion paint to walls and ceiling.
18.22 .Color washing/ snowcem washing/weather coat.
18.23 Synthetic enamel painting to doors and windows.

19 Calculate the analysis of rates for different items of building works.

REFERENCE BOOKS

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

6441 Geotechnical Engineering

T	P	C
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AIMS

- To enable to understand of the origin, composition, classification and properties of soil.
- To assist in understanding the plasticity characteristics and hydraulic properties of soil.
- To assist in understanding the consolidation characteristics of soil.
- To assist in understanding the lateral earth pressure of soil.
- To provide understanding of the site investigation and method of sample collection.
- To provide basic field skill for collection of soil sample.
- To provide basic laboratory skill required to determine soil properties and to perform the relevant calculations.

SHORT DESCRIPTION

Introduction to geotechnic ; Preliminary definition and simple tests; Particle size of soil; Plasticity characteristic of soil; Hydraulic properties of soil; Consolidation characteristics of soil; Subsurface investigation; Lateral earth pressure; Bearing capacity of soil.

DETAIL DESCRIPTION

Theory :

INTRODUCTION TO GEOTECHNIC

1. Understand the basic concept of geotechnic.

1.1 Define rock, soil and soil engineering.
1.2 Describe origin and formation of soil.
1.3 Describe historical origin and formation of soil of Bangladesh.
1.4 Explain limitation of soil engineering.
1.5 Mention the soil classification system.
1.6 State textural, AASHO and unified ASTM system.
1.7 State field identification test such as; dilatancy, toughness, dry strength test.
1.8 List general properties of soil.

PRELIMINARY DEFINITION AND SIMPLE TESTS

2. Understand preliminary definitions and simple test soil.

2.1 Define the following terms: void ratio, porosity, degree of saturation, percentage of air voids, air content, water content, bulk unit wt, dry unit wt, saturated unit wt, submerged unit wt, unit wt. of solids, specific gravity of solids, density index.

2.2 Explain three-phase diagram in terms of void ratio.

2.3 Explain three-phase diagram in terms of porosity.

2.4 Solve problems on soil properties.

2.5 Explain oven drying method of water content determination.

2.6 Explain specific gravity determination by pycnometer method.

PARTICLE SIZE OF SOIL

3. Understand the particle size of soil.

3.1 Define index properties of soil.

3.2 State mechanical analysis of soil.

3.3 Describe sieve analysis.

3.4 Mention and derive stokes law.

3.5 Describe particles size analysis by hydrometer.

PLASTICITY CHARACTERISTICS OF SOIL

4. Understand the plasticity characteristics of soil.

4.1 Define: plasticity of soil, Atterberg limit, liquid limit, plastic limit, shrinkage limit, plasticity index, liquidity index, consistency index, flow index and toughness index.

4.2 State the method of measurement of consistency.

4.3 Define the terms: sensitivity and thixotropy.

4.4 List the uses of consistency (Atterberg) limits.

HYDRAULIC PROPERTIES OF SOIL

5. Understand the hydraulic properties of soil.

5.1 Define the following: Permeability of soil, hydraulic head, piezometric head, position head and Darcy's law.

5.2 State the meaning of constant head and variable head permeability test for determination of co-efficient of permeability.

5.3 Describe the pumping out tests for determination of coefficient of permeability.

5.4 Compute effective pressure and pore water pressure.

5.5 List the factors affecting permeability of soil.

5.6 Define seepage pressure, seepage velocity, equipotential line and flow net.

CONSOLIDATION CHARACTERISTICS OF SOIL

6. Understand the consolidation characteristics of soil.

6.1 Define consolidation and initial, primary and secondary consolidation.

6.2 State behavior of saturated soil under pressure.

6.3 Draw consolidation characteristics of preloaded deposits.

6.4 Identify triaxial compression test apparatus.

6.5 Interpret the results of triaxial tests.

6.6 Explain unconfined and confined compression test.

6.7 Differentiate between consolidation and compaction.

6.8 State standard proctor test of compaction and standard proctor moisture density curve for material.

SUBSURFACE INVESTIGATION

7. Understand the purpose of subsurface investigation.

7.1 State the meaning of subsurface investigation of soil.

7.2 Mention the stages in subsurface explorations.

7.3 Mention the purposes of subsurface investigation of soil.

7.4 Compute the depth and lateral extent of explorations.

7.5 Describe the open excavation methods of explorations.

7.6 Describe auger boring, wash boring, rotary drilling, percussion drilling and core boring.

7.7 Identify various types of soil samples.

7.8 Identify split barrel sampler, spring core catches, scraper bucket and piston sampler for collecting samples.

7.9 Describe the method of standard penetration test.

7.10 State the procedure of writing subsoil investigation report.

LATERAL EARTH PRESSURE

8. Understand the aspect of lateral earth pressure.

8.1 State the meaning of at-rest pressure, active earth pressure and passive earth pressure.

8.2 explain active and passive earth pressure of Rankine's theory with non-surcharge.

8.3 State the formula of active earth pressure of Rankine's theory with surcharge.

8.4 State the fundamental assumptions of Coulomb's wedge theory.

8.5 State the formula of active earth pressure of Coulomb's theory with surcharge.

BEARING CAPACITY OF SOIL

9. Understand the bearing capacity of soil.

9.1 Define bearing capacity of soil.

9.2 Correlate between penetration resistance and unconfined compressive strength for cohesive soil.

9.3 Correlate between penetration resistance and angle of shearing resistance for cohesion less soil.

9.4 Explain the bearing capacity from Standard Penetration Test (SPT).

9.5 List the causes of foundation settlement.

Practical:

1. Determine the water content of soil by oven drying method.
2. Determine the specific gravity of soil by pycnometer method.
3. Determine the particle size of soil by sieve analysis.
4. Determine the particle size of soil by hydrometer analysis.
5. Determine the liquid limit of soil by casagrand's apparatus.
6. Determine the plastic limit of soil.
7. Determine the co-efficient of permeability of soil by constant head test.
8. Collect the sample of soil by wash boring method.
9. Determine the bearing capacity of soil from Standard Penetration Test (SPT).
10. Determine the amount of compaction and the water content by standard proctor test.
11. Determine the shear characteristics of soil by unconfined compression test.
12. Perform the consolidation test.

REFERENCE BOOKS

1 Foundation Engineering

- **Ralph B Peck, Walter, E Hanson**

2 Soli Mechanics and Foundation Engineering

- **Dr. K. R. Arora.**

3. Soil Mechanics and Foundation

- **Dr. B. C. Punmia.**

4 Foundation Analysis and Design

- **Josef and Vawels.**

6444	CONSTRUCTION PROCESS-I	T	P	C
		3	3	4

AIMS

- To apply relevant theory and practice of concrete construction and its quality control methods.
- To provide understanding and skills for construction and supervision of all type of foundations.

- To assist on understanding the process, techniques and materials used in different types of masonry.

SHORT DESCRIPTION

Concrete, Foundation, Shallow foundation, Deep foundation, Brick masonry, Composite masonry, Partition wall, Cavity wall.

DETAIL DESCRIPTION

Theory:

1 Understand the features of concrete.

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

2 Understand the properties of concrete.

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

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

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

4 Understand the concept of curing concrete.

4.1 State the meaning of curing.
4.2 State how the curing process affects the strength of hardened concrete.
4.3 Describe the different methods of curing.
4.4 Mention the advantages and limitations of various methods of curing.

5 Understand the need of different tests on concrete.

5.1 Interpret standard test information to establish the properties of various types of aggregates.
5.2 Express how to draw the grading curve for various sample of aggregate.
5.3 Express how to determine the FM value from the grading curve.
5.4 State the necessity of the following tests on concrete:
   a. Slump test.
   b. Compressive test on hardened cube.
   c. Compressive test on hardened cylinder.

6 Understand the features of different special types of concrete.

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

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

6.3 Explain the term pre-stressed concrete.

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

7 Understand the supervisory aspects of concrete construction.

7.1 List 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 weather.

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

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

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

8 Understand the aspects of foundation.

8.1 Define the term ‘foundation’.

8.2 State the functions of foundation.

8.3 List the essential requirements of a good foundation.

8.4 List the common causes of failure of foundations.

8.5 Explain the remedial measures necessary to overcome the failure of foundations.

8.6 Mention the precautions necessary to prevent uneven settlement of foundations.

9 Understand the features of shallow foundation.

9.1 Define the term ‘shallow foundation’.
9.2 Mention the advantages of shallow foundations.
9.3 Mention the limitations of shallow foundations.
9.4 Mention the suitability of various types of shallow foundations.
9.5 Draw the sketches of strip footing, wide strip footing, eccentrically loaded footing, raft foundation, combined footing, stepped strip foundation, grillage foundation.

10 Understand the features of deep foundation.

10.1 Define the term ‘deep foundation’.
10.2 Mention the classification of pile foundations according to function or use, materials and composition, method of construction.
10.3 Write the advantages and limitations in each case of deep foundations.

10.4 Describe the following methods of casting and placing concrete pile foundation:
   a. Cased cast-in-situ concrete pile.
   b. Uncased cast-in-situ concrete pile.
   c. Pre-cast concrete pile.
10.5 Identify the types of hammers used for pile driving.
10.6 Describe the methods for driving concrete pile groups and placing pile caps.

11 Understand the features of brick masonry.

11.1 State the meaning of brick masonry.
11.2 List the tools required for brick masonry.
11.3 State the specific uses of brick masonry tools.
11.4 Distinguish among different types of masonry structures.
11.5 Define the following terms: header, stretcher, lap, course, bed, joint, closers, perpend.
11.6 Identify the defects in brick masonry.

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

12 Understand the purpose of bond in brick masonry.

12.1 State the meaning of bond in brick masonry.
12.2 Mention the functions of good brick bonding.
12.3 Describe the steps for brick lying.
12.4 Identify different types of bonds in brick masonry.
12.5 Draw the neat sketches of different types of bonds in brick masonry.
12.6 Differentiate between English and Flemish bond.
12.7 Describe the bonding arrangements around openings and corners.

13 Understand the features of composite masonry.

13.1 State the meaning of composite masonry.
13.2 Identify different types of composite masonry.
13.3 Sketch details of brick backed stone slab masonry.
13.4 Sketch details of reinforced brick masonry.
13.5 Mention the advantages and limitations of using reinforced brick masonry.
13.6 Mention the advantages and limitations of hollow clay block masonry.

14 Understand the features of partition wall.

14.1 State the meaning of partition wall.
14.2 Mention the common requirement of partition walls.
14.3 Mention the functions of partition wall.
14.4 List different types of partition walls.
14.5 Describe the procedure of construction of the following types of partition walls:

a. Brick partition wall
b. Concrete partition wall
c. Glass partition wall
d. Aluminum partition wall

e. Light weight partition wall(timber stud work, Ferro-cement plate, hollow blocks)

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

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

15 Understand the features of cavity wall.

15.1 State the meaning of cavity wall.

15.2 Explain the necessity of cavity wall construction.

15.3 Sketch the general features of cavity walls.

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

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

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

15.7 Describe the construction procedure of cavity wall.

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

Practical:

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

2 Determine the slump for different concrete works.

3 Conduct cube test for concrete and interpret the results.

4 Conduct cylinder test for concrete and interpret the results.

5 Construct sample brick pillars of sizes 25cm x 25cm to 75cm x 75cm with English bond.

6 Construct sample brick pillars of sizes 25cm x 25cm to 75cm x 75cm with Flemish bond.

7 Construct sample corner (L) joints of 25cm to 75cm width English bond brick wall.

8 Construct sample corner (L) joints of 25cm to 75cm width Flemish bond brick wall.

9 Construct sample tee (T) joints of 25cm to 75cm width English bond brick wall.

10 Construct sample tee (T) joints of 25cm to 75cm width Flemish bond brick wall.

11 Construct sample cross (+) joints of 25cm to 75cm width English bond brick wall.

12 Construct sample cross (+) joints of 25cm to 75cm width Flemish bond brick wall.

REFERENCE BOOKS

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

6445 HYDRAULICS T P C

3 3 4

AIMS

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

SHORT DESCRIPTION

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

DETAIL DESCRIPTION

Theory :

FLUID AND PRESSURE

1 Understand the basic concept of fluid and its properties.

1.1 Define fluid, liquid and gases.
1.2 Differentiate fluid, liquid and gases.
1.3 Define hydraulics.
1.4 Define density, specific weight, surface tension, capillarity and viscosity of liquid.

2 Understand the aspects of fluid pressure.

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

3 Understand the technique of measuring the fluid pressure.

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

4 Understand the concept of total pressure and center of pressure on immerged plane surface.

4.1 Explain the meaning of total pressure and center of pressure on an immerged plane surface.
4.2 Express the deduction of formula for computing total pressure on a vertically immerged plane surface.
4.3 Express the deduction of formula for computing center of pressure on a vertically immerged plane surface
4.4 Compute total pressure on a vertically immerged plane surface.
4.5 Compute center of pressure of liquid on a vertically immerged plane surface

BUOYANCY

5 Understand the fundamental concepts of buoyancy.

5.1 Define buoyancy and center of buoyancy.
5.2 State the meaning of metacentre and metacentric height.
5.3 Mention the conditions of equilibrium of a floating body.
5.4 Compute the metacentric height using experimental formula

PRINCIPLES OF FLOW OF FLUID

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

6.1 Define various types of flow such as: laminar flow, turbulent flow, steady flow, unsteady flow, uniform flow, non-uniform flow, incompressible flow, rotational flow, irrotational flow, continuous flow.
6.2 Explain the term discharge.
6.3 State the equation of continuity of liquid flow.
6.4 Explain datum head, velocity head, pressure head and total head of a liquid.

7 Understand the concept of Bernoulli's theorem.

7.1 State the Bernoulli's theorem.
7.2 Prove the Bernoulli's theorem.
7.3 Describe construction of venturimeter and pitot tube.
7.4 Compute the discharge in a given pipe line by using venturimeter.
7.5 Compute velocity and discharge in a section of a flowing liquid by using a pitot tube.

FLOW THROUGH ORIFICES AND MOUTHPIECES

8 Understand the aspects of flow through orifice and mouthpiece.

8.1 Define the terms: orifice, jet of water and venacontracta.
8.2 State the meaning of coefficient of contraction (Cc), coefficient of velocity (Cv), coefficient of discharge (Cd).
8.3 State the relation between Cc, Cv and Cd.
8.4 Calculate the time of emptying a rectangular tank and hemispherical vessel through orifice.
8.5 Define the term mouthpiece.
8.6 Explain the functions of a mouthpiece.
8.7 Distinguish between external and internal mouthpieces.

LOSSES OF HEAD OF FLOWING LIQUID

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

9.1 Explain the meaning of fluid friction

9.2 Define different types of losses of head of flowing liquid such as:

a) Loss of head due to friction.
b) Loss of head due to bend and elbows.
c) Loss of head due to sudden enlargement.
d) Loss of head due to sudden contraction.
e) Loss of head at entrance to pipe.
f) Loss of head due to obstruction.

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

9.4 Calculate loss of head due to friction.

FRICTION AND FLOW THROUGH PIPES

10 Understand the aspects of friction and flow through pipes.

10.1 State the meaning of critical velocity of liquid.

10.2 State the meaning of the friction in pipes of flowing liquid, hydraulic gradient and hydraulic mean depth.

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

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

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

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

FLOW OF LIQUID THROUGH NOTCHES AND WEIRS

11 Understand the principle of flow through notches.

11.1 Define notch.

11.2 Identify different types of notches with sketches such as: rectangular notch, V-notch and trapezoidal notch.

11.3 Outline the advantages of triangular notch over rectangular notch.

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

11.5 Calculate the discharges through rectangular notch using discharge formulae.

11.6 Calculate the discharges through triangular notch using discharge formulae.

11.7 Calculate the discharges through trapezoidal notch using discharge formulae.

12 Understand the principle of flow through weirs.

12.1 Define the term weir.

12.2 Outline the differences between weirs and notches.

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

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

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

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

FLOW OF LIQUID THROUGH OPEN CHANNEL

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

13.1 Define the terms: open channel, wetted perimeter and hydraulic radius, hydraulic jump, critical depth.

13.2 State the different types of open channels.

13.3 State the Chezy's formula for velocity of flow in open channel.
13.4 State the Manning's formula for velocity of flow in open channel.
13.5 Select the conditions for most economical section of a rectangular channel.
19.6 Mention the uses of current meter and float to determine velocity of flow.

Practical :

1. Measure pressure at a particular section / point of a tank or pipe line:
   a) by a piezometer.
   b) by a simple manometer.
2. Measure difference of pressure between two sections of a flowing liquid:
   a) by differential manometer.
   b) by inverted differential manometer.
3. Demonstrate proof of Bernoulli's theorem.
4. Measure discharge through a pipe line by venturimeter.
5. Determine coefficient of discharge (Cd), coefficient of velocity (Cv) and coefficient of contraction (Cc).
6. Measure discharge through a triangular notch (V-notch) and calculate coefficient of discharge.
7. Determine co-efficient of friction in GI and PVC pipe.
8. Measure the loss of head due to friction in pipe.
9. Measure the loss of head due to sudden enlargement and sudden contraction of pipe.
10. Observe different types of flow in a typical open channel.
11. Measure velocity of flow in a typical open channel by :
    a) a current meter.
    b) a float.
    c) a pitot tube.
12. Observe hydraulic jump in a typical open channel due to obstruction of flow by a weir and measure the depth of the jump.

REFERENCE BOOKS

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

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

- পদ্মা-মেঘনা-যমুনা বদ্বীপ অধ্যুষিত ভৌগোলিক অঞ্চলে বাঙ্গালী সমাজ গঠন এবং নানা ঐতিহাসিক বিবর্তনের পর্যায় পেরিয়ে গঠিত আধুনিক বাংলাদেশ সম্পর্কে শিক্ষার্থীদের যথার্থ অবগত করানো এবং তাদের সঠিক বোধ সৃষ্টিকরণ।
- প্রাকৃতিক ও অর্থনৈতিক কাঠামোর পরিমন্ডলে বাংলাদেশের সাংস্কৃতিক বিকাশের সাথে শিক্ষার্থীদের উজ্জীবিত করে বাংলাদেশের যোগ্য ও পরিশীলিত নাগরিক হিসাবে যথার্থ বিকশিতকরণ।

সংক্ষিপ্ত বিবরণী

ইতিহাস

- ইতিহাসের সংজ্ঞা।
- বাংলাদেশের আবহাওয়া ও অধিবাসী।
- প্রাগৈতিহাসিক ও প্রাচীনকালে বাংলাদেশ ।
- বাংলায় মুসলমানদের আগমন, প্রতিষ্ঠালাভ ও শাসন – খলজী ও তুর্কী শাসনে বাংলায় স্বাধীন সুলতানী প্রতিষ্ঠা; বাংলাদেশে শাহী আমল, আফগান ও মোঘল আমলে বাংলার শাসন।
- বাংলায় ইউরোপীয় বণিকদের আগমন; নবাবী আমলে বাংলার শাসন ব্যবস্থা; বাংলায় ইংরেজ শাসন ক্ষমতা লাভ ও প্রতিষ্ঠা।
- ব্রিটিশ বিরোধী সশস্ত্র প্রতিরোধ আন্দোলন; সংস্কার আন্দোলন ও জাতীয়তাবাদের বিকাশ এবং বাংলার নবজাগরণ; বঙ্গভঙ্গ ও বঙ্গভঙ্গ উত্তরকালে বাংলার রাজনীতি ও দেশ বিভাগ।
- পাকিস্তান আমলে বাংলাদেশ এবং বাংলাদেশের মুক্তি সংগ্রাম ও যুদ্ধ।

সংস্কৃতি

সংস্কৃতির সংজ্ঞা, আদিযুগে বাংলার সমাজ-সংস্কৃতির রূপরেখা, সুলতানী, মোঘল ও নবাবী আমলের বাংলার সমাজ সংস্কৃতি; ইংরেজ আমলে বাংলার সমাজ ও সংস্কৃতি।
রবীন্দ্র ও নজর"ল যুগ এবং রবীন্দ্র ও নজর"ল উত্তর বাংলার সমাজ ও সংস্কৃতি; পাকিস্তান আমলে বাংলাদেশের সাংস্কৃতিক রূপরেখা; স্বাধীনতাউত্তর বাংলাদেশের সংস্কৃতি।

বিশদ বিবরণী

ইতিহাস

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

১.১ ইতিহাসের সংজ্ঞা প্রদান।
১.২ বাংলাদেশের প্রাচীন জনপদ উলে"খ করা।
১.৩ বঙ্গ বা বাংলা নামের উৎপত্তি ব্যাখ্যা করা।
১.৪ বঙ্গের সীমারেখা চিহ্নিত করা।
১.৫ বাংলার আবহাওয়া ও এর অধিবাসীদের চরিত্রে আবহাওয়ার প্রভাব বিবৃত করা।
১.৬ প্রাগৈতিহাসিক ও প্রাচীন বাংলার আর্থসামাজিক ব্যবস্থা বর্ণনা করা।

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

২.১ গুপ্ত শাসন আমলে বাংলার শাসনব্যবস্থা বর্ণনা করা।
২.২ রাজা শশাঙ্কের রাজ্য বিজয় ও শাসন বর্ণনা করা।
২.৩ বাংলার অরাজকতা ও হিউয়েনসাং এর আমলে বাংলার অবস্থা বর্ণনা করা।
২.৪ গোপাল কর্তৃক অরাজকতার অবসান ঘটানোর কৃতিত্বের বর্ণনা করা।
২.৫ বাংলাদেশে মুসলমানদের আগমন ও বখতিয়ার খলজীর বাংলা বিজয় বর্ণনা করা।
২.৬ বাংলাদেশে স্বাধীন সুলতানী শাসন প্রতিষ্ঠায় শামছুদ্দিন ইলিয়াশ শাঞ্জীর কৃতিত্ব বর্ণনা করা।
২.৭ বাংলায় মোঘল শাসনের ইতিবৃত্ত ব্যাখ্যা করা।
২.৮ ১৭৫৭ সালের পলাশীর যুদ্ধের কারণ, ঘটনা ও ফলাফল বর্ণনা করা।

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

৩.১ দেওয়ানী, দ্বৈতশাসন ও বাংলার দুর্ভিক্ষ বর্ণনা করা।
৩.২ ইংরেজদের চিরস্থায়ী বন্দোবস্ত এবং এর ফলাফল বর্ণনা করা।

৩.৩ বাংলাদেশে জমিদার, প্রজাব্যবস্থা প্রতিষ্ঠা এবং আর্থ-সামাজিক ব্যবস্থায় জমিদারদের ভূমিকা ও প্রজাকুলের সার্বিক অবস্থা উলেণ্ঢখ করা।

৩.৪ ১৯০৫ সালের বঙ্গভঙ্গ আন্দোলন ও ফলাফল ব্যখ্যা করা।

৩.৫ হাজী শরীয়ত উলণ্ঢাহর ফরায়েজী আন্দোলন ও এর ফলাফল ব্যখ্যা করা।

৪. বঙ্গভঙ্গউত্তর রাজনীতি ও দেশ বিভাগ সম্পর্কে অবহিত হওয়া।

৪.১ ১৯৩৭ এর নির্বাচন ও এর বৈশিষ্ট্য উলেণ্ঢখ করা।

৪.২ লাহোর প্রস্তাব ব্যক্ত করা।

৪.৩ ১৯৪৩ এর বাংলার দুর্ভিক্ষের কারণ ও এর পূর্বাপর অবস্থা উলেণ্ঢখ করা।

৪.৪ পাকিস্তানের পূর্বাঞ্চল হিসাবে ১৯৪৭ সালে পূর্ব পাকিস্তানের প্রতিষ্ঠা ব্যাখ্যা করা।

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

৫.১ ভাষা আন্দোলন ও সমকালীন রাজনৈতিক ও সামাজিক প্রেক্ষিত ব্যক্ত করা।

৫.২ আওয়ামীলীগ প্রতিষ্ঠা, যুক্তফ্রন্ট ও ২১ দফা দাবীর ভিত্তিতে নির্বাচন অনুষ্ঠান এবং যুক্তফ্রন্টের মন্ত্রিসভা গঠন ও বাতিল আলোচনা করা।

৫.৩ পাকিস্তানের সামরিক অভ্যুত্থান, আইয়ুব বিরোধী আন্দোলন ও ৬ দফা দাবী, আগরতলা ষড়যন্ত্র মামলার ইতিবৃত্ত বর্ণনা করা এবং পূর্ব-পশ্চিম পাকিস্তানের অর্থনৈতিক বৈষম্যের খতিয়ান উলেণ্ঢখ করা।

৫.৪ ১৯৬৯ সালের গণঅভ্যুত্থান এবং এর ধারাবাহিকতায় বাংলাদেশের মুক্তিযুদ্ধ ও স্বাধীন সার্বভৌম বাংলাদেশ প্রতিষ্ঠা করার পটভূমি ও ঘটনা প্রবাহ বর্ণনা করা।

৫.৫ ১৯৭১ সালের ঐতিহাসিক মুক্তিযুদ্ধ এবং স্বাধীন সার্বভৌম বাংলাদেশের অভ্যুদয় বর্ণনা করা।

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

৬.১ যুদ্ধোত্তর স্বাধীন সার্বভৌম বাংলাদেশের আর্থ-সামাজিক পুনর্গঠন কর্মতৎপরতা বর্ণনা করা।

৬.২ ১৯৭৩ সালের নির্বাচন এবং ১৯৭৪ সালে সংবিধানের ৪র্থ সংশোধনীর মাধ্যমে সরকার পদ্ধতির পরিবর্তন ব্যক্ত করা।

৬.৩ ১৯৭৫ সালের ১৫ আগস্ট জাতির জনক বঙ্গবন্ধু শেখ মুজিবুর রহমান -এর শাহাদাত বরণ এবং রাজনৈতিক পটপরিবর্তন।

৬.৪ ১৯৮১ সালে রাষ্ট্রপতি জিয়াউর রহমানের শাহাদাত বরণ, ১৯৮২ সালের সামরিক অভ্যুত্থান এবং রাজনৈতিক পটভূমি পরিবর্তন।

৬.৫ ১৯৯০ সালে এরশাদ সরকারের পতন এবং তত্ত্বাবধায়ক সরকার পদ্ধতি অনুসংগে ১৯৯১ সনের নির্বাচন এবং গণতান্ত্রিক অনুশীলনের সূচনা।

সংস্কৃতি

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

৭.১ সংস্কৃতির সংজ্ঞা দান।

৭.২ প্রাচীন বাংলার ভাষা সাহিত্য ও সংস্কৃতির রূপরেখা বর্ণনা করা।

৭.৩ বাঙ্গালী সংস্কৃতি নির্মাণে মর্সিয়া ও পুঁথি সাহিত্যের প্রভাব বর্ণনা করা।

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

৮.১ ইংরেজ শাসন আমলে সামাজিক কুসংস্কার দূরীকরণে (স্যার সৈয়দ আহমদ, সৈয়দ আমীর আলী ও রাজা রামমোহন রায়) এর আবির্ভাব এবং তাদের কর্মতৎপরতা ব্যাখ্যা করা।

৮.২ ক্যারি সাহেব এবং ফোর্ট উইলিয়াম কলেজ/সংস্কৃত কলেজ স্থাপনের মাধ্যমে বাংলার নতুন সংস্কৃতির রূপলাভ বর্ণনা করা।

৮.৩ ইংরেজদের শিক্ষানীতি প্রবর্তন ব্যাখ্যা করা এবং কলিকাতা বিশ্ববিদ্যালয় ও ইসলামিয়া মাদ্রাসা স্থাপনের মাধ্যমে বাংলার সংস্কৃতির বিকাশ ব্যক্ত করা ।

৮.৪ ঢাকা বিশ্ববিদ্যালয় প্রতিষ্ঠার ইতিবৃত্ত ব্যাখ্যা করা।

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

৯.১ তৎকালীন পূর্ব পাকিস্তানের তমুদ্দুন মজলিসের ভূমিকা উলেণ্ঢখ করা।

৯.২ ১৯৫২ সালের ভাষা আন্দোলনের সাংস্কৃতিক গুর"ত্ব উলেণ্ঢখ করা।

৯.৩ ঢাকা কেন্দ্রিক শিল্পী-সাহিত্যিকদের বাংগালী সংস্কৃতি বিনির্মাণের ভূমিকা পালন উলেণ্ঢখ করা।

৯.৪ '৬৯ এর গণ আন্দোলনে সাংস্কৃতিক কর্মীদের ভূমিকা উলেণ্ঢখ করা।

৯.৫ বাঙলা একাডেমীর প্রতিষ্ঠা এবং বাংলা ভাষা ও সাহিত্যে এর ভূমিকা উলেণ্ঢখ করা।

৯.৬ আন্তর্জাতিক মাতৃভাষা দিবস হিসেবে ২১ ফেব্র"য়ারির তাৎপর্য ব্যক্ত করা।

৯.৭ ভাষা, শিল্প সাহিত্য চর্চায় সংবাদপত্র ও ইলেকট্রনিক মিডিয়ার ভূমিকা উলেণ্ঢখ করা।

১০. সংস্কৃতির উপর গ্রামীণ অর্থনীতির প্রভাব অবগত হওয়া।

১০.১ তাঁত শিল্প ও মসলিন উৎপাদনের ইতিবৃত্ত ব্যাখ্যা করা।

১০.২ পাট চাষের অর্থনৈতিক প্রভাব ব্যক্ত করা।

১০.৩ বাঙ্গালী সংস্কৃতির অংশ হিসেবে দুগ্ধজাত মিষ্টান্ন সামগ্রীর (মিষ্টি, মাখন, দধি, পিঠা-পুলি প্রভৃতি) প্রভাব ব্যক্ত করা।

১০.৪ দেশীয় মেলা ও পার্বনের সাংস্কৃতিক গুর"ত্ব ব্যাখ্যা করা।

১০.৫ গ্রামীণ পেশাজীবিদের (কামার, কুমার, তাঁতী, জেলে, ছুতার, ইত্যাদি) সাংস্কৃতিক গুর"ত্ব ব্যাখ্যা করা।

১১. বাংলাদেশের সংস্কৃতিতে আদিবাসী সংস্কৃতি ও প্রত্ন তাত্ত্বিক নিদর্শনের অবদান সম্পর্কে অবগত হওয়া।

১১.১ বাংলাদেশের আদিবাসী সম্পর্কে উলেণ্ঢখ করা।

১১.২ বাংলাদেশের সংস্কৃতিতে গাড়ো, রাখাইন, সাওতাল, চাকমা আদিবাসীদের সংস্কৃতিক অবদান ব্যখ্যা করা।

১১.৩ বাংলাদেশের প্রাচীন সংস্কৃতির ঐতিহ্য হিসাবে মহাস্থানগড়, ময়নামতি ও পাহাড়পুরের প্রত্নতাত্ত্বিক নিদর্শনের বর্ণনা দান।

সহায়ক পুস্তক

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5841 BUSINESS ORGANIZATION & COMMUNICATION

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AIMS

- To be able to understand the basic concepts and principles of business organization.
- To be able to understand the banking system.
- To be able to understand the trade system and stock exchange activities in Bangladesh.
- To be able to understand the basic concepts of communication and its types, methods.
- to be able to perform in writing , application for job, complain letter & tender notice.

SHORT DESCRIPTION

Principles and objects of business organization; Formation of business organization; Banking system and its operation; Negotiable instrument; Stock Exchange; Home trade and foreign trade.

Basic concepts of communication Communication model& feedback; Types of communication; Methods of communication; Formal & informal communication; Essentials of communication; Report writing; Office management; Communication through correspondence; Official and semi- official letters.

DETAIL DESCRIPTION

1 **Understand business organization.**
- 1.1 Define business.
- 1.2 Mention the objects of business.
- 1.3 Define business organization.
- 1.4 State the function of business organization.

2 Understand the formation of business organization.
- 2.1 Define sole proprietorship, partnership, joint stock company. and co-operative
- 2.2 Describe the formation of sole proprietorship, partnership , joint stock company, & co operative.
- 2.3 Mention the advantages and disadvantages of proprietorship, partnership and joint stock company.
- 2.4 State the principles of Co operative & various types of Co operative.
- 2.5 Discuss the role of co-operative society in Bangladesh.

3 Understand the banking system and negotiable instrument.
- 3.1 Define bank.
- 3.2 State the service rendered by bank.
- 3.3 Describe the classification of bank in Bangladesh.
- 3.4 State the functions of Bangladesh Bank in controlling money market.
- 3.5 State the functions of commercial Bank in Bangladesh
- 3.6 Mention different types of account operated in a bank.
- 3.7 Mention how different types of bank accounts are opened and operated.
- 3.8 Define negotiable instrument.
- 3.9 Discuss various types of negotiable instrument.
- 3.10 Describe different types of cheque.
- 3.11 Define letter of credit.

4 Understand the home & foreign trade
- 4.1 Define home trade & foreign trade.
- 4.2 Describe types of home trade.
- 4.3 Differentiate between whole sale trade and retail trade.
- 4.4 Define foreign trade.
- 4.5 Mention the advantages and disadvantages of foreign trade.
- 4.6 Mention the classification of foreign trade.
- 4.7 Discuss the import procedure & exporting procedure.
- 4.8 Discuss the importance of foreign trade in the economy of Bangladesh.

5 Understand the basic concepts of communication

5.1 Define communication & business communication.
5.2 Describe the scope of business communication.
5.3 State the objectives of business communication.
5.4 Discuss the essential elements of communication process.

6 Understand the communication model and feedback.

6.1 Define communication model.
6.2 State the business functions of communication model.
6.3 Define feedback .
6.4 State the basic principles of effective feedback.
6.5 Explain the essential feedback to complete communication process.

7 Understand the types of communication.

7.1 Explain the different types of communication.
7.2 Distinguish between upward and downward communication.
7.3 Define two-way communication.
7.4 Describe the advantages and disadvantages of two-way communication.
7.5 Define formal & informal communication.
7.6 Describe the advantages and disadvantages of formal & informal communication.
7.7 Distinguish between formal and informal communication.

8 Understand the methods of communication.

8.1 Define communication method.
8.2 Discuss the various methods of communication.
8.3 Describe the advantages and disadvantages of oral communication.
8.4 Describe the advantages and disadvantages of written communication.
8.5 Distinguish between oral and written communication.

9 Understand the essentials of communication.

9.1 Discuss the essential feature of good communication.
9.2 Describe the barriers of communication.
9.3 Discuss the means for overcoming barriers to good communication.

10 Understand the report writing.

10.1 Define report , business report & technical report.
10.2 State the essential qualities of a good report.
10.3 Describe the factors to be considered while drafting a report.
10.4 Explain the components of a technical report.
10.5 Distinguish between a technical report and general report.
10.6 Prepare a technical report.

11 Understand the office management.

11.1 Define office and office work.
11.2 State the characteristics of office work.
11.3 Define filing and indexing.

11.4 Discuss the methods of filing.
11.5 Discuss the methods of indexing.
11.6 Distinguish between filing and indexing.

12 Understand the official and semi-official letters.

12.1 State the types of correspondence.
12.2 State the different parts of a commercial letter.
12.3 Define official letter and semi-official letter.
12.4 Distinguish between official letter and semi-official letters.
12.5 Prepare the following letters: Interview letter, appointment letter, joining letter and application for recruitment. Complain letters, tender notice.