BANGLADESH TECHNICAL EDUCATION BOARD

4-YEAR DIPLOMA-IN-ENGINEERING PROGRAM

ARCHITECTURE TECHNOLOGY

SYLLABUS

THIRD SEMESTER

Architecture Technology (61)

3rd Semester

Sl. No	Subject code	Name of the subject	T	P	C	Theory		Practical		Total
						Cont. assess	Final exam.	Cont. assess	Final exam.	
1	6131	Architectural Design & Planning-2	1	6	3	10	40	50	50	150
2	6632	Computer Application-2	0	6	2	-	-	50	50	100
3	6432	Surveying-1	2	6	4	20	80	50	50	200
4	6811	Basic Electronics	2	3	3	20	80	25	25	150
5	5931	Mathematics -III	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
		Total	13	27	22	130	520	225	225	1100

6131   Architectural Design & Planning –II   T P C
                                                   1   2   3

Aim

- Able to understand the factors in planning and designing of residential building.
- To develop skills in orientation of different rooms of residential building.
- To provide knowledge and skills of working drawing of residential building

SHORT DESCRIPTION

Fundamentals of design , Basic area , Residential building planning , Area planning of house ,Room arrangement , Floor plan ,

DETAIL DESCRIPTION

Theory :

1. Understand the fundamentals of Architectural design.
      1.1 State the terms of formal & informal design.
      1.2 List the principles of architectural design.
      1.3 List the elements of architectural design.
      1.4 Describe the principles of architectural design.
      1.5 Describe the elements of architectural design.
      1.6 State the style of house.

2. Understand the aspect of residential building planning .
      2.1 List the general requirement of a house.
      2.2 State the different components used in residential building.
      2.3 Describe the function of different components used in residential building.
      2.4 Describe the location of different components used in residential building.
      2.5 Mention the size of different components used in residential building.

3. Undestand basic areas of residential building.
      3.1 List the basic areas of a house
      3.2 Describe basic areas of a house.
      3.3 State the living area of the house(Living and Dining).
      3.4 State the sleeping area of a house (Beds).
      3.5 State the service area of a house (Kitchen , Utility and Stair).
      3.6 Explain the bubble diagram of a house.
      3.7 Explain traffic pattern of a house.

4. Understand the room arrangement of a house .
      4.1 State the location of different room of a house.
      4.2 Describe the function of different room of a house.

4.3 Describe the functional relation of different room of a house.

4.4 State the criteria depends on select the size of rooms of a house.

4.5 State the meaning of the terms Foyer, Corridor,Passage,Verandha, Balcony, Terrace, Open Terrace, Porch, Portico, Head room, Louver, corbell, Offset, Pojection wall, Pent house,,Drip course & Groove.

5. Understand the different types of house.

5.1 List the different types of house.

5.2 Describe different types of house.

5.3 Describe Duplex & Split level house

5.4 Describe difference between single and multistoried building.

5.5 Describe advantage & disadvantage of single and multistoried building.

5.6 State the design process of residential building.

6. Undestand Architectural Drawing.

6.1 Define plan, elevation, section of a residential building.

6.2 State working drawing.

6.3 Describe Detail drawing.

6.4 Describe site plan.

7. Understand the planning of staircase.

7.1 Define staircase.

7.2 Mention the classification of staircase.

7.3 Mention the space requirement for staircase.

7.4 State the relation between tread & riser.

7.5 Mention the planning consideration of staircase.

PRACTICAL :

1. Perform the area planning.

1.1 Draw a bubble diagram showing different areas of a house.

1.2 Show the relationship of three basic area.

1.3 Draw a traffic pattern

1.4 Show the basic types of entrance.

1.5 Sketch a line plan showing different rooms.

2. Prepare the drawing of various environmental consideration.

2.1 Draw the winter and summer sun angle diagram.

2.2 Draw the shading device to control summer and winter sun heat.

2.3 Draw the plan showing position of the building.

2.4 Draw the room plan showing air movement of the room.

3. Prepare the drawing of staircase.

3.1 Draw the plan of a doglegged staircase in 1:50 scale.

3.2 Draw a section of a doglegged staircase in 1:50 scale.

3.3 Draw the plan of a three-quarter turn stair in 1:50 scale.

3.4 Draw the section of a three-quarter turn stair in 1:50 scale.

4. Prepare the presentation drawing.
      4.1 Sketch a line plan of a multistoried two bed room residential building in a given area.
      4.2 Draw the plan of the building in 1:100 scale.
      4.3 Draw the 4-side elevations with rendering of the building in 1:100 scale..
      4.4 Draw the section of the building in 1:100 scale.
      4.5 Draw the roof plan of the building in 1:100 scale.
      4.6 Draw the lay-out plan of the building in 1:200 scale.

5. Prepare the working drawing of a residential building.
      5.1 Draw the floor plan of a house (working drawing) in 1:50 scale with detail dimensions.
      5.2 Draw the elevations in 1:50 scale.
      5.3 Draw a section in 1:50 scale detail dimensions.
      5.4 Draw detail drawing of building component in 1:10 scale.

6. Prepare the detail drawing of toilet & kitchen.
      6.1 Draw the detail toilet plan in 1:20 scale with different fixture layout.
      6.2 Draw the section of toilet in 1:20 scale.
      6.3 Draw the detail kitchen plan in 1:20 scale with different fixture layout.
      6.4 Draw the section of kitchen in 1:20 scale.

REFERENCE BOOKS

1. Architecture Drafting and Design

          Donald E.Hepler
          Paul I.Wallach

2. **wWRwBb iwZ I ¯ícwZ¨K aywv**
          আবু এইচ ইমামউদ্দিন

3. **AwK©UKPwiyÄ WithwUs - 1**
          মোঃ রফিকুল ইসলাম

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.

Surveying- 1

Code: 6432

T	P	C
2	6	4

Objectives

To provide the students with an opportunity to acquire knowledge and skills about:
1. Conduct the survey work with chain, compass and plane table.
2. Conduct cadastral survey.
3. Record surveyed data and plot the surveyed area.
4. Enlarge or reduce the map and calculate the area by using small instrument.

Short Description

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

DETAIL DESCRIPTION

Theory:

INTRODUCTION TO SURVEYING

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

CHAIN SURVEYING

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

3.0 Understand the main instrument used in chain surveying.
    3.1 List the equipment and accessories used in chain surveying.

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

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

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

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

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

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

9.0 Understand errors in chaining.
9.1 List the errors in chaining.

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

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

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

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

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

COMPASS SURVEYING

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

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

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

PLANE TABLE SURVEYING

17.0 Understand basic concept of plane table surveying.
17.1 State the purpose and scope of plane table surveying.
17.2 List the instruments and accessories required for plane-table survey.
17.3 Explain the functions of different instruments and accessories used in plane- table survey.
17.4 Describe the procedure of setting up plane table.
17.5 Explain the term orientation.
17.6 Describe orientation by magnetic needle and back sighting.
17.7 Name the methods of plane table survey.
17.8 Describe radiation, intersection, traversing and resection methods.

18.0 Understand the methods of solving two points and three points' problem.
18.1 Define two points problem.
18.2 Describe the procedure of location of the plan the position of the instrument station of the ground by solving two points problem.
18.3 Define three points problem.
18.4 Describe the procedure of locating on the plan the position of the instrument station on the ground by solving three-points problem

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

CADASTRAL SURVEY

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

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

Practical:

1. Identify the different instruments and accessories required for chain survey.

2. Test and adjust chain.

3. Measure length of line by chain and tape.

4. Set perpendiculars with the help of chain and tape.

5. Set parallel lines with chain and tape.

6. Test and adjust an optical square.

7. Set perpendiculars with the help of optical square.

8. Measure distances across obstacles.

9. Conduct a chain survey of a field.

10. Prepare a chain survey map.

11. Calculate the area of map with the help of planimeter.

12. Identify the different instruments and accessories required in compass survey.

13. Measure magnetic bearing by prismatic and surveyors compass.

14. Identify the different instruments and accessories required in plane table survey.

15. Locate the position to point with the help of plane table.
16. Plot the map of a place by radiation, intersection and traversing.
17. Locate the position of the instrument station of the plan of the plane table by solving three points problem.
18. Locate the position of the instrument station on the plan of the plane table by solving three points problem.
19. Calculate the area from a map with the help of planimeter graphically and analytically.
20. Enlarge a given map up to the desired size with the help of pantagraph.
21. Reduce a given map up to the desired size with the help of pantagraph.
22. Calculate the angle of elevation and angle of depression with the help of abney level.
23. Measure the area of a plot from mouza map.
24. Locate the position of a point in the field which is already plotted on the mouza map.
25. Locate the boundary line of a property with the help of chain, tape and plane table which is already plotted on the mouza map.

Reference Book:

1. Surveying and Levelling - T. P. Kanatker

2. Syrveying - Norman Thomas

3. Surveying - Aziz & Shahjahan

4. Plane & Geodetic Survey - D. Clark

5. Surveying - B. C. Punmia

6. Text book of surveying - S.K.Husain, M.S Nagraj.

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

5931   **MATHEMATICS – III**   **T   P**

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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 $\dfrac{dy}{dx}$, 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

<u>Vector</u>

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.

<u>CO-ORDINATE GEOMETRY</u>

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) $\lim_{x \to 0} \dfrac{\sin x}{x} = 1$

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

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 $\dfrac{dy}{dx}$

11.1   Interpret $\dfrac{dy}{dx}$ geometrically.

11.2   Explain $\dfrac{dy}{dx}$ 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) $\int_0^1 \frac{\left(\sin^{-1} x\right)^2}{\sqrt{1-x^2}}\,dx$

P* = Practical continuous assessment

5931   **MATHEMATICS – III**   **T**   **P**

C

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4

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- To enable to use the knowledge of gradient of a straight line in finding speed, acceleration etc.
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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 $\dfrac{w}{mk}$ or $\dfrac{w}{mc}$

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

        $= \dfrac{KA\,(\theta_H - \theta_C)t}{d}$

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.

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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.