BANGLADESH TECHNICAL EDUCATION BOARD

4-YEAR DIPLOMA-IN-ENGINEERING PROGRAM

FOOD TECHNOLOGY

SYLLABUS

THIRD & FORTH SEMESTER

FOOD Technology(69)
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.	6931	Catering Management	2	6	4	20	80	50	50	200
2.	6811	Basic Electronics	2	3	3	20	80	25	25	150
3.	6632	Computer Application-2	0	6	2	-	-	50	50	100
4.	5931	Mathematics-3	3	3	4	30	120	50	-	200
5.	5922	Physics-2	3	3	4	30	120	25	25	200
6.	5811	Social Science-1	2	0	2	20	80	-	-	100
7.	1012	Engineering Materials	2	3	3	20	80	25	25	150
		Total	14	24	22					1100

FOOD TECHNOLOGY(69)
4th Semester

Sl. No	Subject code	Name of the subject	T	P	C	Theory		Practical		Total
						Cont. assess	Final exam.	Cont. assess	Final exam.	
1.	6941	Food Microbiology	3	6	5	30	120	50	50	250
2.	6942	Applied Nutrition	2	3	3	20	80	25	25	150
3.	6745	Electrical Circuits & Machines	2	3	3	20	80	25	25	150
4.	6832	Industrial Electronics	2	3	3	20	80	25	25	150
5.	7042	Machine Shop Practice	1	6	3	10	40	50	50	150
6.	5821	Social Science-2	2	0	2	20	80	-	-	100
7.	5841	Business Organization & Communication	2	0	2	20	80	-	-	100
		Total	14	21	21					1050

6931   **CATERING MANAGEMENT**   **T   P   C**
                                                             2   6   4

Theory
1. Understand the concept of catering management and catering science.
      1.1   State the meaning of catering science and management.
      1.2   Mention the principle of catering management.
      1.3   list the catering management resources
      1.4   Mention the tools of catering management.
      1.5   Define food and nutrition.
      1.6   Mention the constituents of food.
      1.7   Explain the effects of cooking on nutritional value of food.

2. Understand the concept of kitchen planning and management.
      2.1   Explain the term kitchen planning and management.
      2.2   Mention the important principle of kitchen planning.
      2.3   Explain different types of kitchen.
      2.4   Mention the safety measures in kitchen planning.
      2.5   Explain the kitchen layout plan.
      2.6   Describe a well equipped kitchen.

3. Understand the aspects of meal or menu planning.
      3.1   Explain the menu or meal planning.
      3.2   Mention the different factors to be consideration menu planning.
      3.3   Explain different types of menu.
      3.4   Explain the methods of menu planning.
      3.5   Describe the daily menu.
      3.6   Mention the cyclic menu.
      3.7   List the advantages of menu planning.

4. Understand the aspect of food cooking and service system.
      4.1   Define cooking and service system.
      4.2   List the different method of cooking.
      4.3   Explain the different method of cooking.
      4.4   Explain the holding techniques of cooking food.
      4.5   Mention the different food service systems.
      4.6   Explain the method of waiter service system.
      4.7   List the advantage and disadvantage of water service.
      4.8   Describe the mobile catering service system.

5. Understand the use of heat in catering and the application of refrigeration and the thermostat control in catering.

5.1   Explain the steam heating, roosting and backing.
5.2   Explain the method of cooking in forced convection ovens.
5.3   Stat the meaning of frying.
5.4   Explain the infrared heating.
5.5   Explain the microwave heating.
5.6   Mention the optimum condition for the cold storage of different types of food.
5.7   Mention the application of freezing in catering operation.
5.8   Mention the application of thermostat control in catering system.

6. Under stand the hygiene and sanitation in catering.
6.1   Define hygiene and sanitation.
6.2   Explain "Pathogenic bacteria area capable of cursing food poisoning"
6.3   Explain the method of prevention of spoilage and contamination of food.
6.4   Explain the environmental hygiene and sanitation in catering institution.
6.5   Explain the hygiene in food handling.
6.6   Explain the personal hygiene in catering.
6.7   Explain the use of chemical antiseptics in the maintenance of sanitation environment.

7. Understand the combined system of catering equipment.
7.1   State the meaning of combined system of catering equipment
7.2   Mention the development of combination catering system.
7.3   Explain the work study within the kitchen.
7.4   Explain the following modern catering service systems using tray;
        (a) "Helitherm" system employing heat conservation by insulation.
        (b) "Ganymade" system using the thermal capacity of a hot metal disc.
        (c) "Stellex" system using a tray service with individual electrical heating
            of separate plates.
7.5   Mention the function of a automatic vending machine of hot and cold beverage.
7.6   Explain the composite systems for vending meals.

8. Understand the aspects of space for service area and storage for catering.
8.1   Describe the ideal location of service area for caterings.
8.2   Explain the necessity of decoration in service and dinning area of catering establishment.
8.3   Explain the ideal location and planning of storage space for catering.
8.4   Mention the types of stores of goods for catering.
8.5   Outline the importance of safety in storage.
8.6   Explain the security of stores for catering.

9. Understand the claming and washing in catering centers.
9.1   Outline the importance of cleaning and washing in catering centers.

9.2   Explain the use of water in dish washing.
9.3   List the cleaning agents uses in cleaning and washing.
9.4   Mention the uses of abrasives in catering for cleaning and washing.
9.5   Explain the dish washing process with flow chart.
9.5   Explain the automatic utensils washing machine.
9.6   Explain the process of ultrasonic cleaning.

10 Understand the application of catering equipment Using in catering.
10.1   Mentine the catering equipment.
10.2   Mention the grouping of the catering equipment.
10.3   Illustrate the catering equipment : Traditional oven ranges, Forced air
        Convection ovens, Boilers, Water boilers, Fryers, Grills and Salamanders.
        Bain-marie, Microwave oven,
10.4   List the modern kitchen equipment.
10.5   Describe a sterilizer with figure.
10.6   Describe a pressure cooker with figure.

11. Understand cost concepts in catering
11.1   Mention the components of costs in catering.
11.2   Explain the cost control of food.
11.3   Mention the factors responsible for financial losses.
11.4   Explain the method of controlling food costs.
11.5   Explain the costing of dish, meals and events.
11.6   Explain the method of pricing food.

12. Understand the safety and the personal management in catering.
12.1   Define safety in catering.
12.2   Mention the causes of accidents in catering institute.
12.3   Mention the safety procedure in catering.
12.4   Explain the term personal management in catering.
12.5   State the development of personnel management.
12.6   Outline the importance of training and development of employees in
        catering

Practical :

1. Perform kitchen planning
2. Practice different types of catering services
3. Prepare the soup (chicken, tibboty, vegetables, fish and cream)
4. Prepare the chilly chicken curry.
5. Prepare the beef chilly curry.
6. Prepare the Dhilli mutton.
7. Prepare the sharp beef curry.
8. Prepare the pineapple chicken curry.
9. Prepare the tomato beef curry.
10. Prepare the orange beef curry.
11. Prepare the stick kebab.
12. Prepare the grill kebab.
13. Prepare the fried rice (prawn fish, beef, egg)
14. Prepare the Chinese vegetable.
15. Prepare the chicken berani.
16. Prepare the Katchi berani.
17. Prepare the sandwich.
18. Prepare the orange marmalade.
19. Prepare mixed fruit nectar.
20. Luschi (Mango, Banana)
21. Prepare curd.
22. Prepare yugurt.
23. Prepare fruit custard.
24. Prepare Borhany.
25. Prepare Ice tea and coffee.
26. Prepare chines salad.

<u>**Reference Books**</u>

1. Catering Management
                    -Mohhini sethu and surjeet malhan.
2. Catering science and technology
                    -Magnus pyke
3. Hotel Management and catering course
                    -Humayun kabir
4. A practical guide to restaurant management
                    -Belal Hossain Joy
5. ক্যাটারিং সাইন্স এন্ড টেকনোলজি
                    -বাংলাদেশ কারিগরি শিক্ষা বোর্ড

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 spreadsheet 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.

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

.   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

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

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) $\int_0^1 \frac{(\sin^{-1} x)^2}{\sqrt{1-x^2}}\, dx$

P* =Practical continuous assessment

5922	PHYSICS–II	T	P	C
		3	3	4

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.

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.
Explain prospects of diploma Engineers in self-employment.

1012   **ENGINEERING MATERIALS**   **T**   **P**   **C**

                                                           2   **3**   **3**

AIMS
- To be able to identify and classify the materials used for construction in engineering field.
- To be able to recognize the sources of various engineering materials.
- To be able to understand the characteristics of various engineering materials.
- To be able to understand the uses of different engineering materials.

SHORT DESCRIPTION

Aspects of engineering materials; Engineering uses of ferrous metals and alloys; Engineering use of non-ferrous metal; Bricks; Sand; Cement; Lime as mortar; Aluminum as construction materials; Timber; Stone; Insulating materials; Glass and ceramics, Paints and varnishes, Sound absorbing materials; Fire and water proofing materials; Fuels and lubricants; Plastic materials, optical fiber and Gallium Arsenide Materials.

DETAIL DESCRIPTION
1   Understand the various aspects of engineering materials.
　　1.1　　Define engineering materials.
　　1.2　　Mention the classification of engineering materials in different technology
　　1.3　　List the characteristics of engineering materials.
2   Understand the application of stone
　　2.1　　Define building stones.
　　2.2　　Mention geological, physical and chemical classification of stones.
　　2.3　　List the characteristics of good building stones.
　　2.4　　Describe the dressing of stones.
　　2.5　　Describe the uses of stone in engineering filed.
3   Understand the characteristic of brick as construction materials.
　　3.1　　Define brick.
　　3.2　　Mention different constituents for manufacturing of good bricks.
　　3.3　　Explain pug mill, table molding and machine molding.
　　3.4　　Describe the process of brick drying.
　　3.5　　Describe the methods of kiln burning of brick.
　　3.6　　Draw the sketches Bull's trench kiln & Hoffman's kiln.
4   Understand the application of sand.
　　4.1　　Mention the classification of sand according to their sources.
　　4.2　　Mention the specifications of good sand.
　　4.3　　Describe the purpose of grading of sand.
　　4.4　　Mention the use of various grades of sand.
5   Understand the application of cement.
　　5.1　　Define cement.
　　5.2　　Mention the functions of various ingredients of cement.
　　5.3　　Distinguish between wet process and dry process of manufacturing Portland cement.
　　5.4　　Draw a flow diagram based on wet process of manufacturing of cement.
　　5.5　　Mention the uses of cement as engineering material.

6   **Understand the application of tiles**
     6.1   Identify the following tiles: clay tiles, concrete tiles, Plastic tiles, Mosaic tiles, Marble tiles, Glazed tiles.
     6.2   Describe the uses of different kinds of tiles.

7   **Understand the Light metal (aluminum/white metal) as construction materials.**
     7.1   Explain the important properties of light metal (aluminum/white metal) as construction material.
     7.2   Mention the uses of aluminum white/metals .
     7.3   Describe the advantages and disadvantages of using aluminum as construction material.

8   **Understand the fundamental concepts of glass and ceramics.**
     8.1   Mention the constituents of glass.
     8.2   List the properties of glass.
     8.3   Mention the uses of glass.
     8.4   Describe the constituents of ceramics.
     8.5   Mention the classification of ceramics.
     8.6   List the properties of ceramics.
     8.7   Describe the uses of ceramics in engineering field.

9   **Understand the basic concepts of paints and varnishes.**
     9.1   Define paints and varnish.
     9.2   Explain the characteristics of good paint.
     9.3   List the essential constituents of paint.
     9.4   Explain the functions of pigment.
     9.5   List the main constituents of varnishes.
     9.6   Explain the characteristics of good varnish.
     9.7   Mention the functions of vehicle.
     9.8   Describe synthetic materials used for paint and varnishes.

10   **Understand the characteristic of timber as construction materials.**
     10.1   Define timber.
     10.2   Mention the classification of trees depending on botanical groups.
     10.3   Explain conservation of timber in various market forms.
     10.4   Describe the major defects in timber.
     10.5   Describe the advantages and disadvantages of using timber in the engineering filed.
     10.6   Describe the characteristics of good timber.

11   **Understand the application of various heat and sound insulating materials.**
     11.1   Mention the functions of insulating materials.
     11.2   List five natural heat insulating materials.
     11.3   Mention the names of synthetic insulating materials.
     11.4   Describe the sources of obtaining rubber, cork and ebonite.
     11.5   Describe the uses of asbestos as insulating material.
     11.6   List three natural sound absorbing materials.
     11.7   Mention the names of five sound absorbing materials.
     11.8   Explain light weight concrete used in acoustic works.

12   Understand the fundamental aspects of fire and water proofing materials.
12.1   Mention the term of fire proofing materials and water proofing materials.
12.2   Explain the uses of asbestos as fire and waterproof materials.
12.3   List the characteristics of refractory materials.
12.4   Explain the uses of rubber as water proofing material.

13   Understand the basic concepts of fuels and lubricants.
13.1   Define the term fuel and lubricants.
13.2   Mention the main purposes of fuels with their classifications.
13.3   List different types of lubricants.
13.4   Explain the characteristics of lubricating oils.

14   Understand the engineering applications of plastic materials.
14.1   Define plastic.
14.2   List the names of raw materials for plastic.
14.3   Explain the properties of plastic.
14.4   Mention the characteristics of thermoplastic and thermosetting plastic.
14.5   Describe the manufacturing process of plastic.
14.6   Explain the molding methods of plastic products.
14.7   Identify the uses of plastic as engineering materials.
14.8   Explain laminating plastic.

15   Understand the engineering uses of metals and alloys.
15.1   Name the common types of iron used in industry.
15.2   Mention the uses of wrought iron and cast iron.
15.3   Mention the classification of steel on the basis of carbon content.
15.4   List the names of commercial steels.
15.5   Describe alloy steel.
15.6   Mention the uses of various alloy steels.
15.7   Define non-ferrous metals.
15.8   List the important non-ferrous metals used in engineering field.
15.9   Mention the uses of non-ferrous metals and alloys like copper, zinc, tin, lead, brass and bronze.

16   Understand the Engineering use of Conducting, Magnetic, Optical fiber   and Gallium Arsenide Materials
16.1   List of least three items for conducting, none conducting and semi-conducting materials.
16.2   Describe the uses of semi-conducting materials.
16.3   Name the types of soft and hard magnetic materials.
16.4   Mention the uses of optical fiber.
16.5   Mention the uses of Gallium Arsenide Materials.

PRACTICAL:
1. **Show skill in identifying various types of stone**
   1.1. Selected different type of stone in the laboratory.
   1.2. Sketch different type of stone on the basis of formation.
2. **Show skill in field test of bricks**
   2.1. Perform field test of bricks
   2.2. Select 1st class , 2nd class, 3rd class bricks and jhama bricks
3. **Show skill in conducting laboratory test of bricks**
   3.1. Perform:
      (a) Compression test
      (b) Absorption test
   3.2. Determine average weight of a brick.
4. **Show skill in conducting laboratory test of cement**
   4.1. Conduct laboratory tests of cement
      (a) Make cement paste of Normal Consistency(CPNC)
      (b) Determine initial setting time
      (c) Perform final setting time
      (d) Perform compressive strength test
      (e) Perform tensile strength test
      (f) Perform fineness test
   4.2. Conduct field tests of cement
5. **Show skill in conducting tests of coarse aggregate**
   (a) Specific gravity of send
   (b) Grading of aggregates
6. **Show skill in conducting test of sand**
   (a) Bulking of sand
   (b) F M of sand
   (c) Specific gravity of sand
7. **Show skill in identifying various ferrous and non ferrous metal**
   7.1. Identify mild steel, cast iron, copper, and aluminum, tin by physical observation.
8. **Show skill in identifying various type fuels and lubricants**
9. **Show skill in identifying various type of conducting & non conducting, semi conducting**, **magnetic and optical fiber materials.**

REFERENCE BOOKS
1   A text book on Engineering Materials   —   G. J. Kulkarni
2   Engineering Materials   —   Dr. M. A. Aziz
3   Plastic Materials   —   J. A Brydson

BANGLADESH TECHNICAL EDUCATION BOARD

4-YEAR DIPLOMA-IN-ENGINEERING PROGRAM

FOOD TECHNOLOGY

SYLLABUS

FORTH SEMESTER

6941	**Food Microbiology**	T	P	C
		3	6	5

AIMS

- To acquaint with microbial organisms in food microbiology.

- To be able to acquaint with microbial species and microbial contamination, spoilage of food and food products.

- To be able to acquire knowledge on food borne diseases and their prevention.

- To be able to appreciate the safety measures to be taken against microbial hazards.

- To be able to develop skill to detect microorganisms from food and food products.

- To develop skill in detecting isolation and preservation of microbial cultures and microbial species by laboratory test (examination).

SHORT DESCRIPTION

Basic concept of microbiology; Classification of microorganisms; Microscopy; Staining of bacteria; Staining techniques and pure culture techniques; Morphology and physiology of microorganism; microbiology of milk and milk products; microbiology of meat; microbiology of fish; Microbiology of poultry; Microbiology of egg; Microbiology of fermented foods; Spoilage of canned foods.

DETAIL DESCRIPTION

<u>Theory :</u>

1. **Understand the basic concepts of Microbiology and microorganisms.**

    1.1 Define Microbiology and food microbiology.

    1.2 State the meaning of microorganism.

    1.3 Outline the economic importance of microorganisms.

    1.4 State the objects of classification of microorganisms.

    1.5 Describe five major characteristics of microorganisms.

    1.6 Parameters affecting the growth of microorganisms.

    1.7 Explain the taxonomy and classification of microorganism.

    1.8 State the kock's postulates.

2. **Understand the features of bacteria and yeast.**

    2.1 Define bacteria and yeast.

    2.2 Mention the classification of bacteria and yeast according to cell shape and size, systematic classification, nutritional requirements, oxygen requirements, temperature requirements, formation of flagella and formation of spores.

    2.3 Importance of bacteria and yeast.

    2.4 State the non bacterial intoxication.

    2.5 Define mycotoxin & aflatoxin.

    2.6 State of symptoms & mechanisms of aflatoxin.

    2.7 Discuss the biological effects of aflatoxin.

    2.8 Mention quantitative measurement of bacterial growth.

3. Understand the features of fungi, algae, protozoa and virus.

   3.1 Define fungi, algae, protozoa and virus.

   3.2 Mention the classification of fungi, algae, protozoa and virus.

   3.3 Importance of fungi, algae, protozoa and virus.

   3.4 Effect of fungi, algae, protozoa and virus on human beings.

   3.5 Factors effect of fungi, algae, protozoa and virus.

   3.6 Mention the characteristics of fungi, algae, protozoa and virus.

   3.7 Name the division and classes of viruses.

   3.8 Explain the multiplication of viruses.

4. Microscopy and standing of bacteria..

   4.1 Explain microscope, simple microscope, compound microscope and electron microscope.

   4.2 Outline the necessity of microscope.

   4.3 Mention the classification of the compound and electron microscope.

   4.4 Write the name of different parts of a simple microscope.

   4.5 Explain the cleaning methods of different parts of a compound microscope.

4.6 Distinguish between compound and electron microscope.

5. Understand the staining of bacteria and culture techniques.

   5.1 Explain the preparation of smear for simple staining.

5.2 Mention the procedures of the bacteria staining techniques : simple staining, gram staining, flagella staining, spore staining and capsule staining.

5.3 Define culture & classification of culture.

5.4 Name three methods employed for inoculation of media for a pure culture of bacteria.

5.5 Explain the meaning of sterilization.

5.6 Mention the methods of isolation of species in a pure culture.

5.7 Discuss briefly five methods of preservation of microbial culture.

5.8 Explain the measurement of pH of a microbial culture medium.

6. Understand the morphology of microorganisms and reproduction of bacteria.

6.1 List the types of microorganisms important if food microbiology.

6.2 Mention the morphological characteristics of molds.

6.3 List five genera of molds of industrial importance.

6.4 Name different structures of a typical bacteria cell with a neat sketch.

6.5 Distinguish between gram (+ve) and gram (-ve) bacteria cell wall.

6.6 Explain the bacterial reproduction and different types of reproduction of bacteria.

6.7 Mention the binary fission types of bacterial reproduction.

6.8 Mention the important characteristics of the genus pseudomonas.

6.9 Explain the reproduction of yeast by budding.

7. Understand the concept of cell anatomy and cell division.

    7.1 Define cell and cell division.

    7.2 Distinguish between plant cell and bacterial cell.

    7.3 Explain the functions of cell wall, plasmids, nucleus, flagella, vacuoles and mitochondria.

    7.4 Mention the different methods of cell division.

    7.5 Describe the mitosis process of cell division.

    7.6 Explain the process of meiosis cell division.

    7.7 Distinguish between mitosis and meiosis cell division.

8. Understand the microbiology of milk and milk products.

    8.1 Define milk contamination and sources of contamination of milk and milk products.

    8.2 Mention the microorganism present in milk and milk products and prevention of contamination of milk and milk products.

    8.3 Define butter, cheese, curd, yogurt, evaporated milk and condensed milk.

    8.4   Explain pasteurization of milk.

    8.5 Describe the homogenization of milk and milk products.

    8.6 Describe the method of reduction test of milk.

    8.7 Describe the confirming pasteurization test.

9. Understand the microbiology of meat and fish.

    9.1 Mention the sources of contamination of meat and fish.

9.2 Mention the different types of microorganisms responsible for the contamination of meat and fish.

9.3 Explain the preservation of meat by curing.

9.4 List the factors that influence the growth of microorganisms underlying meat spoilage.

9.5 Describe the spoilage of fresh meat caused by microorganisms.

9.6 Discuss the factors influencing the rate of spoilage of fish.

9.7 Explain causes of spoilage of fish.

9.8 Distinguish between chilling and freezing.

10. Understand the microbiology of poultry and egg.

10.1   Name the sources of contamination of poultry and egg.

10.2   Name of bacteria responsible for the spoilage of poultry and egg.

10.3   Mention the different methods of preservation of poultry.

10.4   Explain the preservation of poultry by freezing.

10.5   Describe the change of eggs caused by microorganism.

10.6   Explain the methods of removal of microorganism from whole egg.

10.7   Mention the different methods of preservation of egg.

11. Understand the microbiology of fermented food and food products.

11.1   Define fermented foods.

11.2   Explain fermented dairy products.

11.3   Explain the fermentation process of wine from grape juice.

11.4   Describe the microbial spoilage of wine.

11.5   Mention the factors affecting the growth of microorganism in wine.

11.6   Describe the microbiology of soft drinks.

11.7   Mention the quality of water used in the food and beverage industries.

12. Understand the poisoning and spoilage of food and food products.

12.1   Define food poisoning, bacterial food infection and bacterial food intoxication.

12.2   Describe the food borne diseases.

12.3   Name the causal organisms of Botulism, Salmonellosis, Staphylococcus food intoxication.

12.4   Discuss the condition necessary for outbreaks and prevention of Botulism, Salmonellosis, Staphylococcus food intoxication.

12.5   Mention microbial spoilage of foods and causes of spoilage.

12.6   Mention the chemical and biological spoilage of canned food.

12.7   Describe the following types of biological spoilage of canned foods: Flat sour spoilage, thermophilic anaerobe (TA) spoilage, sulfide spoilage, spoilage by mesophillic spore forming bacteria, Spoilage by non spore forming bacteria.

12.8   Describe the spoilage of canned foods by yeast and molds.

12.9   Mention the unusual types of spoilage of canned foods.

Practical:

1. Draw neat sketch of simple microscope, compound microscope and digital microscope.
2. Identify the different parts of simple microscope, compound microscope and digital microscope.
3. Perform sterilization of equipments by using sterilizer.
4. Make media culture by using different culture medium.
5. Determine the coli forms count of milk and milk products.
6. Determine the standard plate count of milk before and after pasteurization.
7. Determine the yeast and molds count in milk and milk products.
8. Determine the different types of bacteria percent in the supplied sample of market fish and meat microbiology.
9. Determine the different types of bacteria present in the egg shell microbiology.
10. Determine the different types of bacterial present in the supplied sample of fruit microbiology.
11. Determine the different types of bacterial present in the supplied sample of vegetable product microbiologically.
12. Determine microbiologically the coliform count, yeast and molds present in the sample of fruit and beverage.
13. Determine the different types of bacteria present in the supplied sample of yogurt microbiologically.

14. Determine the different types of bacteria present in the sample of pickle microbiologically.

15. Determine the number of bacteria present on equipment microbiologically.

16. Determine the number of bacteria present on working surface by standard plate count method.

17. Determine the bacteria present on utensils using swabbing methods.

18. Develop a double strain culture for yughart.

REFERANCE BOOKS:

1. Food Microbiology- W.C Frazis & D.C Westhoffs
2. Mordern Food Micribiology- James M. Reid
3. Microbiology- Michaul J Pelazan & Roger O Reid
4. Microbiology- M.R Chowdhury
5. Laboratory Technique Food and Dairy Micribiology- Harrigan and Mc Cance
6. মাইক্রোবায়োলজি- ড. মোহাম্মদ সিরাজুদ্দীন।
7. দুগ্ধ বিজ্ঞান- ড. মোঃ আবদুল হামিদ মিঞা।
8. ব্যবহারিক খাদ্যের অণুজীবতত্ত্ব- মুহাম্মদ মফিজুর রহমান।

6745 ELECTRICAL CIRCUITS AND MACHINES	T	P	C
	2	3	3

AIMS

- To provide understanding and skill on AC circuits.
- To develop concept on polyphase system.
- To familiarize with the construction and operating principle of transformer.
- To develop understanding on the principles of DC motor.
- To develop knowledge and skill on 3-phase and 1-phase induction motor.
- To develop understanding on the principle of synchronous motor.

SHORT DESCRIPTION

Complex algebra – application to AC circuits; RLC series and parallel circuits; Polyphase system; Star and delta connection; Transformer; Rotating electrical machines; DC motor; 3-phase induction motor; 1-phase induction motor; Synchronous motor and stepper motor.

DETAIL DESCRIPTION

Theory :

1   Apply the Principle of Vector and Vector Quantities.
     1.1   Define Vector Quantities.
     1.2   Explain the Vector representation of alternating voltage and current.
     1.3   Explain the Vector in polar and rectangular form.
     1.4   Formulate the relation between Vectors Expressed in rectangular and polar co-ordinate.
     1.5   Solve problems related to Vector sum and difference, multiplication and division.

2   Apply the concept of AC series circuit containing resistor, Inductor and Capacitor.
     2.1 Draw the circuit containing resistor, Inductor and Capacitor**.**
     2.2 Draw the Vector diagram RLC series circuit.
     2.3 Compute the results of RLC series circuit in cartesian form and polar form notation.
     2.4 Solve problems of RLC series circuit in rectangular co-ordinate system and polar co-ordinate system.
     2.5 Draw the circuit containing resistor, Inductor and Capacitor In parallel.
     2.6 Draw the Vector diagram of RLC parallel circuit.
     2.7 compute the results of parallel AC circuit in cartesian form and polar form notation.
     2.8 Solve problems on parallel Ac circuit in cartesian form and polar form notation.

3   Understand the application of complex algebra for power calculation.
     3.1   Calculate power employing complex form.
     3.2   Calculate VAR employing complex form.
     3.3   Describe the conjugate method of calculating real power.
     3.4   Describe the conjugate method of calculating reactive power.

POLYPHASE SYSTEM
4   Understand the concept of poly-phase system.
    4.1   State the term poly-phase system.
    4.2   List the advantages of poly-phase system over single phase system.
    4.3   State the generation of poly-phase emf.
    4.4   Sketch the phase voltage wave diagram.
    4.5   Identify the phase sequence of poly-phase system.
    4.6   State the effects of reverse phase sequence.
    4.7   Explain the methods of checking phase sequence.
    4.8   Sketch the phase sequence diagram of 3-phase voltage.

5   Apply the concept of polyphase for interconnection.
    5.1   Write down possible ways of interconnection of three phase system.
    5.2   Draw the circuit diagram of star connected 3-phase, 3-wire system.
    5.3   List the application of 3-phase, 3-wire, star connected system.
    5.4   Sketch 3-phase, 4-wire, star connection system.
    5.5   List application of 3-phase, 4-wire star connection system.
    5.6   Draw the vector diagram of 3-phase, 4-wire, star connection system.
    5.7   Interpret the relation between line and phase voltage and current in a balanced 3-phase, 3-wire, star connection system.
    5.8   Simplify the relation between line and phase voltage and current in a balanced 3-phase, 4-wire star connection system.

6   Understand the function of 3-phase star connection system.

    6.1   Define Balance and Unbalance System
    6.2   Identify neutral wire in a 3-phase star connection system.
    6.3   Evaluate the current in the neutral wire in an unbalanced 3-phase, 4-wire, star connected system.
    6.4   Draw the phasor diagram of 3-phase, 4-wire star connected system.
    6.5   Discuss the formula $I_L = I_P$ and $V_L = \sqrt{3} V_p$
    6.6   Calculate volt-ampere, power and power factor in a balanced   3-phase, 4-wire star connected system.
    6.7   Solve problems on star connected (balanced and unbalanced) power system.

7   Understand the features of 3-phase delta connection system.
    7.1   Draw the circuit diagram of a 3-phase delta connected system.
    7.2   Draw the phasor diagram of delta connected system.
    7.3   Express the deduction of the formula $V_L = V_P$ and $I_L = \sqrt{3} I_P$ for connected system.
    7.4   Simplify the relation between line and phase current & voltage in a balanced delta connected system.
    7.5   Calculate the volt-ampere, power and power factor in a balanced 3-phase, delta connected system.
    7.6   Solve problems on delta connected balanced system.
    7.7   Compare the advantages of star connected system with those of delta connected system.

TRANSFORMER
8   Understand the principle of operation of transformer.
  8.1   Define transformer.
  8.2   Explain the working principle of transformer.
  8.3   Explain the emf equation of a transformer.
  8.4   Explain no load operation of transformer.
  8.5   Explain operation of transformer at load condition.
  8.6   Solve problems related.
9   Understand the constructional features of transformer.
  9.1   Describe the constructional features of transformer.
  9.2   Identify different types of transformer.
  9.3   List the uses of transformer.
  9.4   Explain transformation ratio (voltage, current and turns).
  9.5   Solve problems on transformation ratio.

10   Understand the concept of losses, efficiency and voltage regulation of transformer.
  10.1   Explain different losses in transformer.
  10.2   Explain the factors affecting core loss and copper loss.
  10.3   Explain the equation for maximum efficiency.
  10.4   Explain the open circuit test and short circuit test of a transfoer.
  10.5   Solve problems on efficiency and maximum efficiency.
  10.6   Explain the equation for voltage regulation of transformer.
  10.7   Solve problems on voltage regulation of transformer.

DC MOTOR
11   Understand the principle of DC motor.
  11.1   Explain the working principle of DC motor.
  11.2   Explain generator action of motor.
  11.3   Explain the term torque, running torque and break down torque.
  11.4   Explain the torque equation of motor.
  11.5   Describe the constructional features of DC motor.
  11.6   Explain the function of commutator.

12   Understand the characteristics of DC motor.
  12.1   Identify different types of DC motor.
  12.2   Explain the performance characteristics of different types of DC motor.
  12.3   Describe starting methods of DC motor.
  12.4   Describe speed control of DC motor.

INDUCTION MOTOR
13   Understand the principle of induction motor.
  13.1   Explain the general principle of induction motor.
  13.2   Distinguish between the principles of induction motor and conduction motor.
  13.3   Define sleep and sleep speed.
  13.4   Identify the types of induction motor.

13.5   List the uses of induction motor.

THREE-PHASE INDUCTION MOTOR
14   Understand the working principle of 3-phase induction motor.
14.1   Explain the construction of 3-phase induction motor.
14.2   Explain the construction of a 3 phase squirrel case induction motor.
14.3   Explain the construction of a 3 phase wound rotor induction motor.
14.4   State the production of rotating magnetic field in a 3-phase induction motor.
14.5   Describe the methods of starting 3-phase induction motor.
14.6   State the principles of speed control of 3-phase induction motor.

SINGLE-PHASE INDUCTION MOTOR
15   Understand the working principle of 1-phase induction motor.
15.1   Explain working principle of 1-phase induction motor.
15.2   Explain the self starting method of single phase motor.
15.3   Describe the principles of operation of standard split phase motor.
15.4   Describe the principles of operation of capacitor motor.
15.5   Describe the principles of operation of shaded pole motor and repulsion motor.
15.6   Identify hysteresis motor, universal motor, reluctance motor and AC series motor.
15.7   Mention the methods of speed control of single phase induction motor.

SPECIAL MOTORS
16   Understand the working principle of synchronous motor and Stepper motor.
16.1   Explain the principle of operation of synchronous motor.
16.2   Describe the constructional features of synchronous motor.
16.3   Describe the starting methods of synchronous motor.
16.4   Explain the working principle of stepper motor.
16.5   List the different types of stepper motor.
16.6   Describe construction of different stepper motors.

Practical :

1   Determine the value of resistance, inductance & capacitance and draw vector diagram of RLC series circuit.
1.1   Sketch the circuit diagram for RLC series circuit.
1.2   Select equipment, tools & materials for the experiment.
1.3   Connect the circuit according to the circuit diagram.
1.4   Check all connection points before energizing the circuit.
1.5   Record the readings from the meter connecting power supply to the circuit.
1.6   Find the values of resistance, inductance, capacitance and phase angle from the relevant data.
1.7   Verify the impressed voltage is equal to the vector sum of voltage drops in each parameter.
1.8   Sketch the vector diagram with the help of relevant data as obtained.

2   **Determine the values of resistance, inductance, capacitance and draw the vector diagram of RLC parallel circuit.**
    2.1   Sketch the circuit diagram for RLC parallel circuit.
    2.2   Select equipment, tools & materials for the experiment.
    2.3   Connect the circuit according to the circuit diagram.
    2.4   Check all connection points before energize the circuit.
    2.5   Record the readings from the meter connecting power supply to the circuit.
    2.6   Find the value of resistance, inductance, capacitance and phase angle from the relevant data.
    2.7   Verify the line current is equal to the vector sum of branch currents.
    2.8   Sketch the vector diagram with the relevant data as obtained.

3   **Demonstrate poly-phase power system and identify phase sequence.**
    3.1   Sketch the circuit diagram of a poly-phase power system showing phase sequence.
    3.2   Select equipment, tools & materials for the experiment.
    3.3   Study and connect the poly-phase system.
    3.4   Observe the voltages by voltmeter.
    3.5   Observe the phase voltages by oscilloscope.
    3.6   Compute phase sequence.

4   **Measure line and phase voltage & current in a 3-phase star connected inductive load.**
    4.1   Sketch the circuit diagram for 3-phase star connected load.
    4.2   Select equipment, tools & materials for the experiment.
    4.3   Connect the circuit according to the circuit diagram
    4.4   Check all connection points before connecting power supply.
    4.5   Record the readings of instruments.
    4.6   Compare the recorded values with calculated values.
    4.7   Note down the observations remarks.

5   **Measure line and phase current & voltage in 3-phase delta connected inductive load.**
    5.1   Sketch the circuit diagram for 3-phase delta connected load.
    5.2   Select equipment, tools & materials for the experiment.
    5.3   Connect the circuit according to the circuit diagram.
    5.4   Check all connection points before connecting power supply.
    5.5   Record the readings of the instruments.
    5.6   Compare the recorded values with calculated values.
    5.7   Note down the observations.

6   **Measure current, voltage and power in a balanced 3-phase star connected inductive load and construction of vector diagram.**
    6.1   Sketch the circuit diagram for measuring power by 3 watt meters of a 3-phase system.
    6.2   Select equipment, tools & materials for the experiment.

6.3   Connect the circuit according to the circuit diagram.
6.4   Check all connection points and equipment & instruments before actual operation.
6.5   Record the readings from the meters in the circuit.
6.6   Calculate the power from the formula
$P_t = W_1 + W_2 + W_3$ and $3V_pI_p \cos \theta$
6.7   Draw the vector diagram using relevant data as obtained.
6.8   Note down the observations.

7   Measure current, voltage and power in a balanced 3-phase delta connected inductive load and construction of vector diagram.
7.1   Draw the circuit diagram for measuring power by 3-watt meter method of 3-phase delta connected load.
7.2   Select equipment, tools & materials for the experiment.
7.3   Connect the circuit according to the circuit diagram.
7.4   Check all connections, equipment and instruments before actual operation.
7.5   Record the reading from the meters used in the circuit.
7.6   Calculate the power from the formula
$P_t = W_1 + W_2 + W_3$ and $P_t = \sqrt{3} \, V_{lL}L_{Ll} \cos\theta$
7.7   Draw the vector diagram using obtained data.
7.8   Note down the observations.

8   Find the transformation ratio of a transformer.
8.1   Develop a circuit to perform the experiment.
8.2   Select required equipment and materials.
8.3   Connect the components according to the circuit diagram.
8.4   Check the connections.
8.5   Record the primary (E_P) and secondary (E_S) voltages.
8.6   Calculate the transformation ratio using the relation
$$\frac{E_S}{E_P} = \frac{N_S}{N_P} = K$$
8.7   Note down the observations.

9   Perform open circuit test of a single phase transformer.
9.1   Select the circuit diagram for the experiment.
9.2   Select required, equipment, tools and materials.
9.3   Connect all the equipment according to the circuit diagram.
9.4   Connect the low side to its rated voltage to the power supply keeping high side open.
9.5   Record instrument readings.
9.6   Calculate required data.
9.7   Draw no load vector diagram with the data obtained.
9.8   Note down the observations.

10   Perform short circuit test of a single phase transformer.
10.1   Select the required circuit diagram for the experiment.
10.2   Select required, equipment, tools and materials.

10.3   Connect the equipment according to the circuit diagram.
10.4   Energize the circuit by applying reduced voltage.
10.5   Record copper loss and calculate R'_e, X'_e and Z'_e.
10.6   Note down the observations.

11   Construct load versus speed characteristic curve of DC shunt motor.
    11.1   Draw the required circuit diagram for the experiment.
    11.2   Select the instrument and materials required.
    11.3   Connect all the instrument's according to diagram.
    11.4   Take the necessary data from the connected instruments.
    11.5   Draw the required curve.
    11.6   Note down the observations.

12   Study the components/parts of a 3-phase induction motor.
    12.1   Prepare a list of the parts of a 3-phase induction motor.
    12.2   Dismantle the components/parts of the motor.
    12.3   Develop sketches of each part.
    12.4   Sketch the developed diagram of the windings of the motor.
    12.5   Assemble the dismantled parts.
    12.6   Note down the observations.

13   Operate a 3-phase induction motor.
    13.1   Sketch the circuit diagram.
    13.2   Select required, equipment, tools and materials.
    13.3   Connect starter with motor.
    13.4   Connect power supply to the circuit.
    13.5   Observe the operation.
    13.6   Measure the speed of the rotor.
    13.7   Note down the observations.

14   Start a 1-phase capacitor type motor/ceiling fan with regulator.
    14.1   Select the equipment and tools required for the experiment.
    14.2   Sketch a working diagram.
    14.3   Identify the two sets of coils.
    14.4   Connect the capacitor with the proper set of coil.
    14.5   Connect power supply to the fan motor.
    14.6   Test the rotation of the motor opposite direction by changing the capacitor connection.
    14.7   Note down the observations.

15   Operate a synchronous motor by changing field excitation.
    15.1   Select required equipment, tools, machine and materials.
    15.2   Sketch the circuit diagram.
    15.3   Connect the instrument according to the diagram.

15.4   Check the circuit.
15.5   Change the field excitation.
15.6   Record armature and field current.
15.7   Draw the 'V' curve.
15.8   Note down the observations.

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2.   Electrical Machine   –   Siskind

6942	APPLIED NUTRITION	T	P
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		2	3
3			

AIMS

- *To be able to understand the basic concepts of nutrition.*
- *To be able to understand the digestive enzymes and metabolism.*
- *To be able to perform the experiments of applied nutrition.*

SHORT DESCRIPTION

Basic concepts of food and nutrients

Carbohydrates in nutrition; Proteins & amino acids, Function of lipids, Vitamins and their functions; Functions of minerals and water Nutrative process; Dieteties and diet planning; Nutritional deficiency diseasses.Role of hormones in metabolism; inter relation ship between Nutrients, Nutrition of expectant and Nursing mother.

DETAIL DESCRIPTION

Theory:

1. ***Understand the basic concepts of food and nutrients****.*

   1.1   Define food and nutrients.

   1.2   Explain the term nutrition.

   1.3   Discuss the role of food in the maintenance of good health.

   1.4   Mention the classification of food.

   1.5   Describe the function of food and nutrients.

2. ***Understand the carbohydrates in nutritions.***

   2.1   Define carbohydrate.

   2.2   Describe the source of carbohydrate in food.

   2.3   Classification of carbohydrate.

   2.4   Explain the dietary requirement of carbohydrates.

   2.5   Discuss the functions of carbohydrate in human body.

3. ***Understand the proteins and amino acids and their function.***

   3.1   Define and classify protein.

   3.2   Explain the structure of protein.

   3.3   Explain the daily requirements of protein in food

3.4   Define amino acids and essential amino acids.

3.5   Classification of essential amino acids

3.6   Describe the functions of proteins and amino acids in human body.

3.7   Describe the effect of protein deficiency in food in human body.

4. Understand the functions of lipids.

4.1   Define lipids.

4.2   Describe the classification of lipids.

4.3   Describe fats and oils in food.

4.4   Describe the function of fats and oils in nutrition.

4.5   Mention the daily requirements of fats and oils for a normal weight   industrial worker.

4.6   Describe the effect of deficiency of facts and oils in food.

5. Understand the vitamins and their function in nutrition.

5.1   Define vitamin A,C,D,E,K and B Complex.

5.2   List fats and water soluble vitamins.

5.3   Explain the function of vitamins in human body.

5.4   Describe the diseases caused due to the dificiency of vitamin A,C,D,E,K and vitamin Bcomplex.

5.5   Explain the hypervitaminosis of vitamins A and D.

5.6   State thiamin, riboflavin and nicotinic acid.

5.7   Describe the function of riboflavin and nicotinic acid.

6. Understand the function of minerals and water in human nutrition.

6.1   List the different minerals which are important in human nutrition.

6.2   Describe the function of calcium, sodium, iron, potassium and iodine in human nutrition.

6.3   Explain the effect of iron and calcium, deficiency in human body.

6.4   Mention the diseases due to deficiency of Iodine in human body.

6.5   Explain the daily requirement of water in human body.

7. Understand the nutritive processes.

7.1 Explain metabolic water and metabolism.

7.2 Mention the function of water in human body.

7.3 Mention the daily requirements of water in human body.

7.4   Mention the function of water in salt balance of human body.

7.5   List the digestive enzymes.

7.6   Describe digestion system.

7.7   Describe protein digestion.

8. Understand the dietetics and diet planning for different age group people.

8.1   Define dietetics and causes of dietetics.

8.2   Explain the term standard diet and balanced diet for infants.

8.3   Describe the basic food groups.

8.4   Mention the importance and method of diet planning.

8.5   Describe the balanced diet for school going children and youngman of normal health.

8.6   Describe diet during pregnancy and lactating women.

8.7   Explain malnutrition due to defective feeding of infants.

9.   Understand the nutritional deficiency diseases.

9.1   Explain diet in diabetes tuberculosis and food allergy.

9.2   Describe diet in acute in digastion and dysentry.

9.3   Explain protein-energy malnutrition(PEM) and causes of PEM.

9.4   State the sign and syntoms of PEM.

9.5   Explain the diseases scurvey and its causes.

9.6   Explain the causes of aneamia goiter and beriberi and eats effect.

10. Understand the role of Hormones in metabolism.

10.1   Describe mode of action of Hormones.

10.2   Explain action cell membranes and Action on cell nucleus.

10.3   Explain the effects of Hormones on protein metabolism.

10.4   Explain the effects of Hormones on fat metabolism.

10.5   Explain the causes of obesity and heriditary.

11. Understand inter relationship between nutrients.

11.1   Describe protein energy inter relationship.

11.2   Explain the effect of carbohydrates,fats and proteins and calori restriction on protein content of the body.

11.3   Explain vitamin-vitamin inter relationship.

11.4   Explain body mass index and calculation of BMI.

12. Understand nutrition of expectant and nursing mother.

12.1   Describe physiological Adjustments during pregnancy.

12.2   Explain the factors affecting the course and outcome of pregnancy.

12.3   Explain nutritional requirements during pregnancy.

12.4   Explain the effect of malnutrition and socio-economic factors on the nutritional status of pregnant women.

Practical:

1.   Assess the nutritional health of an infant by measuring the height and weight.

2.   Assess the nutritional health of a child by measuring weight, hight upper arm circumfercuse and mix fold.

3.   Develop a questionnaire for family food pattern and collect data from random samples and find out the defects of that ranily food pattern if any.

4.   Calculate the fat precentage of a man.

5.   Detemine the nutritional status of a group of children.

6.   Determine the precentage of fat in a sample of milk.

7.   Prepare the balance diet by local ingredients.

8.   Determine the precentage of protein in a sample of food.

9.   Determine the presence of aflataxin in a sample of food.

10.   Calculate the total energy present in supplied quantity of food.

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by Wilson Fisher and Fugug.

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by King M.

3. Human Nutrition and Dietetics

by Sir Stanley Dav idson.

4. principles of nutrition

by Wilson Fisher and Fuqua.

5.Advanced text Book on Food and Nutrition

by Dr.M Swaminathan.

৬. *পুষ্টি ওখাদ্য ব্যবস্থা*

ডঃসিদ্দিকা কবির

৭. *খাদ্য ও পুষ্টি*

নারায়ন বসু

৮. *বিপাকওপুষ্টি বিজ্ঞান*

সৈয়দা হামিদা রহমান।

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6832   # Industrial Electronics

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AIMS

- To provide understanding and skill on SCR and TRIAC.
- To provide understanding and skill on phase controlled rectifier.
- To provide understanding and skill on wave shaping circuits.
- To familiarize with integrated circuits.
- To give an understanding on the Operational Amplifier.
- To develop comprehensive knowledge and skill on power switching device.
- To provide understanding and skill on optoelectronic device and security system.
- To provide understanding and skill on special electronic equipment.
- To familiarize with the programmable logic controller.

SHORT DESCRIPTION

UJT, SCR, PUT, DIAC, TRIAC, controlled rectifier, wave shaping circuits, integrated circuit, Operational amplifier, Power switching devices; Optoelectronic device; Security system; Special electronic equipment and Programmable logic controller.

DETAIL DESCRIPTION

Theory:

1.   Understand the Concept of Unijunction Transistor (UJT).

      1.1   Describe the structure and operation of UJT.

      1.2   Identify the UJT by its equivalent circuit.

      1.3   Define standoff ratio.

      1.4   Explain why UJT is not a thyristor.

      1.5   Analyze the operation of a UJT relaxation oscillator.

1.6   Analyze the operation of UJT controlled SCR dc operated time-delay circuit.

2.   Understand the Concept of Silicon Control Rectifier (SCR)

2.1   Define Thyristors.

2.2   Mention the types of Thyristors.

2.3   Describe the construction and operation of SCR.

2.4   Describe the I-V characteristics of SCR.

2.5   Explain the operation of SCR using two-transistor Equivalent circuit.

2.6   Derive the equation for anode current.

2.7   Explain how to turn an SCR on and off.

2.8   Define various parameters and mention the ratings of SCR.

2.9   Explain the operation of automatic battery charger, emergency lighting.

2.10   System, heater control, and over voltage protection circuits.

2.11   Mention the advantages of SCR as a switch.

2.12   Describe the construction and operation of light activated SCR (LASCR).

3   ***Understand the Concept of Controlled Rectifier.***

    3.1   *Define Controlled Rectifier.*

    3.2   *Mention the types of control rectifier.*

    3.3   *Describe the operation of half wave controlled rectifier using SCR for resistive and inductive load with wave shapes.*

    3.4   *Drive the equation for load current and voltage of half wave controlled rectifier for resistive and inductive load.*

    3.5   *Analyze the operation of single-phase full-wave mid-point controlled rectifier, Half controlled and full controlled bridge rectifier with wave shapes.*

    3.6   *Drive the equation for load current and voltage of full wave rectifier.*
    3.7   *Explain the effect of freewheeling diode in rectifier circuit with inductive load.*

    3.8   *Describe the operation of poly-phase controlled rectifier.*

    3.9   *Mention the operation of (a) Illumination circuit (b) Speed control of dc and ac motors.*

4   ***Understand the Concept of Programmable Unijunction Transistor (PUT)***

    4. 1 Describe the structure and operation of the PUT.
    4. 2 State how to set the trigger voltage of PUT.
    4. 3 Explain the difference between a PUT and UJT.
    4. 4 Analyze the operation of a PUT relaxation oscillator.

5.   Understand the Concept of DIAC and TRIAC

    5.1   Describe the structure and operation of DIAC.

    5.2   Explain the I-V characteristics curve of DIAC.

    5.3   Describe the structure of TRIAC.

    5.4   Discuss the SCR equivalent circuit of TRIAC.

    5.5   Explain the triggering modes of TRIAC.

    5.6   Describe the characteristics curve of TRIAC.

    5.7   State the commutation of TRIAC.

5.8   Analyze the operation of TRIAC firing circuits using (i) DIAC (ii) UJT.

5.9   Analyze the operation of a TRIAC phase control, lamp dimmer and Heat control circuit.

6.   Understand the features of wave shaping circuits.

6.1   Mention the types of wave shaping circuit.

6.2   Discuss the principles of RC and RL differentiating and integrating circuits.

6.3   Analyze the output waves for various input wave shapes of differentiating and integrating circuit.

6.4   Explain the operation of various clippers by PN junction diode, zener diode and transistor.

6.5   Describe the operation of of diode clamping circuit for different input wave shape.

7.   Understand the Features of Integrated Circuit (IC).

7.1   Define IC

7.2   List the advantages and limitation of IC's.

7.3   Mention the scale of integration.

7.4   Identify the types of integrated circuits.

7.5   Describe the fabrication monolithic integrated circuits.

7.6   Describe the fabrication of integrated circuit components resistor, capacitor BJT and FET.

8.   Understand the Features of Operational Amplifier (Op- Amp)

8.1   Define operational amplifier.

8.2   Recognize the Op-Amp symbol.

8.3   Identify the terminals on Op-Amp packages.

8.4 State the basic principle of Op-Amp.

8.5 Analyze the equivalent circuit of Op-Amp.

8.6 State the golden rule and virtual ground of Op-Amp.

8.7 List the characteristics of an ideal Op-Amp.

8.8 Describe the input& output impedance, input offset voltage, input bias current, input offset current, common-mode input voltage range, open-loop voltage gain, common-mode rejection ratio, slew rate, frequency response and unity-gain bandwidth.

8.9 Explain the operation of Op-Amp in inverter, scale changer, unity follower, comparator, phase shifter, adder, subtractor, differentiator, integrator, ramp generator, multichannel amplifier and filters.

9. Understand the feature of advance power switching devices

9.1 Describe the construction of GTO, IGBT, MCT, SIT and SITH & LASCR.

9.2 Explain the principles of operation of GTO, IGBT, MCT, SIT and SITH & LASCR.

9.3 Mention the v-i characteristics of GTO, IGBT, MCT, SIT and SITH &LASCR devices.

9.4 List the application of various power switching devices.

10. Understand the features of photo resistors, photo diodes and phototransistors.

10.1 Describe the basic structure of photo resistors, photo diodes & photo transistors.

10.2 Explain the operating principles of photo resistors, photo diodes & photo transistors.

10.3 Explain the v-i characteristics curve of photo resistors, photo diodes and photo transistors.

10.4 List typical applications of photo resistors, photo diodes and photo transistors.

10.5   Explain a block diagram showing how photo detectors used in speed measuring system.

10.6   Explain the operation of photo diode switching circuit.

10.7   Explain the operation of photo transistor switching circuit.

11.   Understand the features of security system.

11.1   Explain the operation fire (smoke) indication system using lionizatio detector and photo 11.2 transistor with block diagram.

11.3   Describe the operation of touch and non-touch type person (thief) detector using Infrared detection system with block diagram.

11.4   Explain the operation of video monitoring system using video camera and video monitor (With multiple monitor switching).

12.   Understand the features of special electronic equipment.

12.1   Mention the principles of operation of UPS with block diagram.

12.2   Mention the principles of operation of SMPS with block diagram.

12.3   Mention the principles of operation of multimedia projector with block diagram.

13.   Understand the features of programmable logic controllers (PLCs).

13.1   Mention the basic operating and programming principles of PLCs.

13.2   Draw a simplified block diagram showing the main parts of a PLC.

13.3   State the function of main part of PLC.

Practical:
1   Determine the characteristics curve of UJT.
1.1   Select an appropriate experiment circuit, required materials, tools and equipments.

1.2   Connect the circuit as per diagram with meters.
1.3   Check the circuit and switch on the power supply.
1.4   Record the data for I-V curve.
1.5   Plot the curve.

2   Study the gate control of forward breakdown voltage for an SCR.

2.1   Select an appropriate circuit, required tools, equipments and materials.
2.2   Connect the circuit as per diagram with meters.
2.3   Switch on the power supply and make proper adjustments.
2.4   Set the gate control at minimum and observe the breakdown voltage for I-V characteristics.
2.5   Increase gate current in steps and observe the breakdown voltage.
2.6   Plot the I-V characteristics curve.
2.7   Compare different curves and breakdown voltage.

3   Study the Operation of a single phase controlled rectifier using SCR.
3.1   Select an appropriate experiment circuit.
3.2   Select required tools, equipments and materials.
3.3   Connect the circuit as per diagram with Oscilloscope.
3.4   Check the connection and switch on the power supply.
3.5   Observe the wave shapes at relevant points of the circuit.

4   Study the Operation of a Illumination Circuit.
4.1   Select an appropriate experiment circuit.
4.2   Select required tools, equipments and materials.
4.3   Connect the circuit as per diagram.
4.4   Check the connection and switch on the power supply.
4.5   Adjust the POT and observe the Illumination.

5   Determine the characteristics curve of DIAC.
5.1   Select an appropriate experiment circuit, required materials, tools and equipments.
5.2   Connect the circuit as per diagram with meters.
5.3   Check the circuit and switch on the power supply.
5.4   Record the data for I-V curve.
5.5   Plot the curve.

6   Study the Operation of a RC differentiating circuit.
6.1   Select a RC differentiating circuit.
6.2   Select required materials, tools and equipments.

6.3   Connect the circuit as per diagram with CRO.
6.4   Switch on the power supply.
6.5   Adjust the signal frequency   for the differentiating circuit.
6.6   Observe the output wave for different input wave shape on CRO screen.

7   **Study the Operation of a RC Integrating circuit**.
7.1   Select a RC differentiating circuit.
7.2   Select required materials, tools and equipments.
7.3   Connect the circuit as per diagram with CRO.
7.4   Switch on the power supply.
7.5   Adjust the signal frequency   for the differentiating circuit.
7.6   Observe the output wave for different input wave shape on CRO screen.

8   **Study the operation of biased and unbiased series and shunt clipping circuits for positive and negative peak and bias clipping of a sine wave using switching diodes.**
8.1   Select a required circuit.
8.2   Select the associate equipments and materials.
8.3   Buildup the circuit for required wave shapes.
8.4   Switch on the power supply.
8.5   Observe the output on CRO screen.

9   **Study the operation a clamping circuit.**
9.1   Select a required circuit.
9.2   Select the associate equipments and materials.
9.3   Buildup the circuit for required wave shapes.
9.4   Switch on the power supply.
9.5   Observe the output on CRO screen.

10   **Study the operation of Op-Amp (for IC 741) as inverting and non inverting amplifier, adder, comparator, buffer and subtractor.**
10.1   Select a required circuit.
10.2   Select the associate equipments and materials.
10.3   Buildup the circuit as per function.
10.4   Switch on the power supply.
10.5   Observe the input and output wave shape on CRO screen.

11   **Study the operation and application of SMPS./UPS**
11.1   Select a SMPS/UPS
11.2   Identify different parts of SMPS/UPS
11.3   Observe the operation of SMPS/UPS
12   **Determine the v-i characteristic curve of photo diode.**
12.1   Select a required circuit.
12.2   Select tools and materials.

12.3   Build up the circuit
12.4   Check the connection.
12.5   Switch on the power supply
12.6   Record the data.
12.7   Plot the curve.

13   Study the operation of PLC.
13.1   Select a PLC trainer.
13.2   Identify different parts of turner
13.3   Observe the operation of PLC for specific purpose.

<u>REFERENCES:</u>

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     - Robert L. Boylestad, Louis Nashelsky

2. Electronic Devices

     - Floyd

3. Power Electronics

     - Dr. P.S. Bimbhra

4. Principles of Electronics
5. A Text Book of Applied Electronics

     - R. S. Sedha

7042	MACHINE SHOP PRACTICE	T	P	C
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OBJECTIVES

- To enable recognize commonly used machine tools.
- To provide understanding the functions of commonly used machine tools.
- To develop skills in setting up and operating of machine tools.
- To provide concept of using Coolant in machining.
- To provide ability to set and operate commonly used allied tools and accessories.
- To provide understanding the operation of Milling Machine.

SHORT DESCRIPTION

Machine tools: Lathe machine; Drilling machine; Shaper; Grinding machine; Milling Machine; Measuring techniques.

DETAIL DESCRIPTION

<u>**Theory :**</u>

1   **Understand the concept of machine tools.**
1.1   State what is meant by machine tools.
1.2   Classify commonly used machine tools.

1.3   State general safety precautions to be observed in machine shop.

2   **Understand the application of Lathe machine.**
2.1   Identify different types of lathe machines.
2.2   Identify major components of lathe machine.
2.3   Explain the function of different parts and attachments of lathe machine.
2.4   Carry out basic calculations for speed and feed for lathe works.
2.5   State safety precautions during working on a lathe.
2.6   Identify single point cutting tools, tool materials, cutting angles and their relevant functions.

3.   **Understand the application of Coolant in machining operation.**
3.1   Explain the nacessity of coolant in machining.
3.2   Indentify different types of coolant.
3.3   Describe the use of various types of coolant.

4.   **Understand the application of drilling machine.**
4.1   Identify different types of drilling machine.
4.2   Explain the function of different drilling machines.
4.3   Identify major components of drilling machine.
4.4   Illustrate workholding methods.
4.5   Carry out basic calculations for speed and feed.
4.6   State safety precautions during working on a drilling machine.
4.7   Identify different types of twist drill, tool materials, cutting angles and their relevant functions.

5.   **Understand the application of shaper.**
5.1   Identify the shaping machines.
5.2   Identify major components of shaping machine.
5.3   Describe the quick return mechanism and ram adjustments.
5.4   Explain how to set a workpiece on the machine table of shaper.
5.5   Identify typical operations for shaper.
5.6   State safety precautions during working on the shaper.

6   **Understand the application of grinding machine.**
6.1   Identify different types of grinding machines.
6.2   Distinguish surface grinder, cylindrical grinder and pedestal/bench grinder.
6.3   Explain the need for grinding wheel balancing.
6.4   Identify typical operations for the pedestal and surface grinder.
6.5   State safety precautions during working on grinding machine.
6.6   Identify grinding wheel types, bonds and uses.

7   **Understand the features of milling machine.**
7.1   State the meaning of Milling.
7.2   Identify different types of milling machine.
7.3   Indentify the principal parts of a milling machine.

7.4   Distinguish among plain, universal, and vertical milling machine.
7.5   Identify the verious kinds of milling cutter.
7.6   Mention the use of various milling cutter.
7.7   State safety precautions during working on milling machine.
7.8   Mention the care and maintenance of milling cutters.

Practical :

1   Demonstrate the setting and operating of lathe machine.
1.1   Perform simple setting up of machine, workpiece, tool bit and setting machine speed and feed.
1.2   Carry out machining operations for facing, parallel turning, center drilling.
1.3   Produce a job to an engineering drawing specification.
1.4   Carry out additional machining operations of knurling, taper turning, drilling, parting off, simple screw cutting and boring.
1.5   Sharpen a number of commonly used single point cutting tools using pedestal grinder.
1.6   Observe workshop safety precautions.

2   Demonstrate the setting and operating of shaping machine.
2.1   Perform simple setting up of machine, workpiece, tool bit, speed and feeds, ram position and stroke.
2.2   Carry out machining operation for parallel shaping and vertical face shaping.
2.3   Produce a simple job to an engineering drawing specification.
2.4   Observe workshop safety precautions.

3   **Demonstrate the setting and operating of a drilling machine.**
3.1   Perform simple setting up of machine, workpiece, drill bit, speeds and feeds.
3.2   Sharpen a twist drill on the pedestal grinder.
3.3   Drill a number of holes with appropriate drill bit.
3.4   Observe workshop safety precautions.

4   **Demonstrate the setting and operating of a grinding machine.**
4.1   Determine type of wheel, grit, bond, balance and soundness by ringing.
4.2   Mount grinding wheel on machine spindle.
4.3   Use the pedestal grinder to grind single point tools and drill bits.
4.4   Perform simple setting up of surface grinding machine workpiece, magnetic chuck, hydraulic system of machine feed.
4.5   Produce a job to an engineering drawing specification.
4.6   Observe ground surface finish, grain direction, bouncing of wheel.
4.7   Carry out wheel dressing exercise on both pedestal grinder and surface grinder.
4.8   Observe workshop safety precautions.

5   Demonstrate workshop maintenance practice.
5.1   Produce a maintenance schedule common used in machine shop.

5.2 Carry out simple maintenance procedures, including lubrication.
5.3 Observe workshop safety precautions.

6 Milling machine setting and operation.
6.1 Set up the machine vice and hold workpiece to produce a flat surface using a milling cutter.
6.2 Prodece the parallel and slotted workpiece using appropriate cutter.

REFERENCE BOOKS

4 Basic Machine Shop Practice I & II
— V. K. Tejwani
5 Workshop Technology I & II
— W. A. J Chapman
6 Machine Shop Practice I & II
— Berghardt
7 Machine Shop Practice
— Somenath De
8 Machine tool operation
— Anderson.

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

● পদ্মা-মেঘনা-যমুনা বদ্বীপ অধ্যুষিত ভৌগোলিক অঞ্চলে বাঙালী 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 নজরুল যুগ এবং রবীন্দ্র ও নজরুল 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 উল্লেখ 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 ইলিয়াস শাহ্ঞীর 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 উল্লেখ করা।
  - ৩.৪ ১৯০৫ সালের বঙ্গভঙ্গ আন্দোলন ও ফলাফল ব্যখ্যা করা।
  - ৩.৫ হাজী শরীয়ত উল্ঢাহর ফরায়েজী আন্দোলন ও এর ফলাফল ব্যখ্যা করা।

৪. বঙ্গভঙ্গউত্তর রাজনীতি ও দেশ বিভাগ সম্পর্কে অবহিত হওয়া।
  - ৪.১ ১৯৩৭ এর নির্বাচন ও এর বৈশিষ্ট্য উল্লেখ করা।
  - ৪.২ লাহোর প্রস্তাব ব্যক্ত করা।
  - ৪.৩ ১৯৪৩ এর বাংলার দুর্ভিক্ষের কারণ ও এর পূর্বাপর অবস্থা উল্লেখ 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 উল্লেখ 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 উল্লেখ করা।

৯.২ ১৯৫২ সালের ভাষা আন্দোলনের সাংস্কৃতিক গুরুত্ব উল্লেখ করা।

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

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

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

৯.৬ আন্তর্জাতিক মাতৃভাষা দিবস হিসেবে ২১ ফেব্রুয়ারির তাৎপর্য ব্যক্ত করা।

৯.৭ ভাষা, শিল্প সাহিত্য চর্চায় সংবাদপত্র ও ইলেকট্রনিক মিডিয়ার ভূমিকা উল্লেখ 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 গুরুত্ব ব্যাখ্যা করা।

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

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

১১.১ বাংলাদেশের আদিবাসী সম্পর্কে উল্লেখ করা।

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

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

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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.