ELECTRONICS TECHNOLOGY (68)

THIRD SEMESTER

SL NO	Subject Code	Name of the subjects	T	P	C	Marks				Total
						Theory		Practical		
						Cont. Assess	Final Exam	Cont. Assess	Final Exam	
1.	6831	Electronic Devices and Circuits - II	3	3	4	30	120	25	25	200
2	6732	Electrical Engineering-II	3	3	4	30	120	25	25	200
3	6632	Computer Application - I	0	6	2	-	-	50	50	100
4	5931	Mathematics-III	3	3	4	30	120	50	-	200
5	5922	Physics - II	3	3	4	30	120	25	25	200
6	5722	English – II	2	2	3	20	80	50	-	150
7	5811	Social Science – I	2	0	2	20	80	-	-	100
		Toal	15	20	23					1150

ELECTRONICS TECHNOLOGY (68)

FOURTH SEMESTER

SL NO	Subject Code	Name of the subjects	T	P	C	Marks				Total
						Theory		Practical		
						Cont. Assess	Final Exam	Cont. Assess	Final Exam	
1.	6841	Digital Electronics – I	3	6	5	20	130	50	50	250
2	6840	Industrial Power Electronics & Applications	3	3	4	20	130	25	25	200
3	6843	Networks Filters and Transmission Lines	3	3	4	20	130	25	25	200
4	6842	Communication Engineering – I	3	3	4	20	130	25	25	200
5	6632	Computer Application– II	1	3	2	10	40	25	25	100
6	5821	Social Science – II	2	0	2	20	80	-	-	100
7	5841	Business Organization & Communication	2	0	2	20	80	-	-	100
		Total	17	18	23					1100

6841   **DIGITAL ELECTRONICS > I**   **T**   **P**   **C**
                                                                 3   **3**   **4**

AIMS
● To develop knowledge & skill on number systems, binary arithmetic operation and codes.
● To provide knowledge & skill on logic gates, ICs, logic circuits and Boolean algebra.
● To assist to acquire the knowledge & skill on combinational logic circuit.

SHORT DESCRIPTION
Basic concept of digital electronics; Number system & codes; Logic gates & ICs; Boolean algebra and logic simplification & Combinational logic circuits.

DETAIL DESCRIPTION

BASIC CONCEPT OF DIGITAL ELECTRONICS

1   Understand the aspects of digital electronics.
        1.1   Define digital electronics.
        1.2   Mention the characteristics of digital and analog signal.
        1.3   State the advantages of working in digital mode.
        1.4   Define logic level.
        1.5   Mention how voltage levels are used to represent digital quantities.
        1.6   Describe various parameters of a pulse waveform such as rise time, fall time, pulse width, frequency, period, and duty cycle.

NUMBER SYSTEMS & CODES.

2   Understand the number system and binary arithmetic operation.
        2.1   Describe decimal, binary, octal and hexadecimal number system.
        2.2   Convert one number system to another.
        2.3   Compute binary arithmetic (addition, subtraction, multiplication and division) including binary point.
        2.4   Compute 1`s and 2`s complement subtraction.
        2.5   State the applications of different number system.
        2.6   Explain the representation of unsigned and floating point number in binary.

3   Understand the arithmetic codes and code conversion.
        3.1   Define codes.
        3.2   Distinguish weighted & non-weighted codes.
        3.3   Describe the 8421, Excess–3 and other popular BCD codes?
        3.4   Describe the addition and subtraction of 8421, Excess-3 and BCD coded number.
        3.5   State the meaning of gray code.
        3.6   Convert gray code to binary and vice versa.
        3.7   State parity checked code and Hamming code.
        3.8   Describe the error detection and correction with Hamming code. and parity checked code.
        3.9   Describe the ASCII code & Unicode.

LOGIC GATES & ICs

4   Understand the concept of Logic gates.
    4.1   Define logic gate..
    4.2   Define AND, OR, NOT, NOR, NAND, and EX-OR gates.
    4.3   Draw the symbols and use of logic gates.
    4.4   Prepare the truth table and Boolean equations of logic gates.
    4.5   Give the physical concept of AND, OR and NOT operations.
    4.6   Explain the AND, OR and NOT operation with electronic circuit.

5   Understand the features of the logic families and digital IC's.
    5.1   Mention the classification logic families.
    5.2   Define SSI, MSI, LST and VLSI.
    5.3   List the types of unipolar and bipolar logic families.
    5.4   State the characteristics of digital IC's.
    5.5   State the meaning of the terms propagation delay time, speed, noise immunity, logic level, power dissipation, fan-in, fan-out, floating input, Sourcing and sinking, standard loading, loading rules, operating temperature and power rating of logic circuits.
    5.6   State the difference of DTL, TTL, MOS, I^2L and ECL families.

6   Understand the concepts of electronic circuit of logic gates.
    6.1   Describe the operation of open collector & totempole output circuit for standard TTL NAND gate.
    6.2   Describe the CMOS circuit operation.
    6.3   State special logic gates such as buffer, tri-state and expandable gates.
    6.4   Mention the basic principle of ORing and ANDing.
    6.5   Define fixed function Integrated circuit (IC).
    6.6   classify fixed function IC
    6.7   Mention IC package, code numbers, important specification of TTL/MOS commercial IC gates.
    6.8   Distinguish the difference between 74 and 54 series of logic circuit.

BOOLEAN ALGEBRA & LOGIC SIMPLIFICATION

7   Understand the process of logic simplification.
    7.1   State the single and multi-variable theorems of Boolean algebra.
    7.2   Explain the universality of NAND and NOR gates .
    7.3   State DeMorgan's theorems and utilize them to simplify the logic expression.
    7.4   State the terms-Sum of Product (SOP) form and Product Of Sum (POS) form.
    7.5   Determine the SOP & POS form from truth table.
    7.6   State the steps of algebraic simplification.
    7.7   Define Karnaugh Map.
    7.8   State the structure of Karnaugh map.
    7.9   State the simplification process of Boolean expression from a K-map and design logic circuit (up to 4 variables).

COMBINATION LOGIC CIRCUIT.

8   Understand the features of combinational logic circuits.
    8.1   Define combinational logic circuit with example.
    8.2   Mention the application of combinational logic circuit.

8.3   Describe the operation of half and full adder with logic circuit and expression.
8.4   Describe the operation of controlled inverter.
8.5   State the principle of half subtraction and full subtraction.
8.6   Describe the operation of 4 bit parallel adder.
8.7   Describe the operation of 4 bit subtraction circuit..
8.8   Describe the operation of parity generator and detector circuit.
8.9   Describe the operation of 4 bit BCD & Excess-3 adder.
8.10   Describe the operation of multipliers & divisors.

9.   Understand the concepts of encoder, decoder and display devices.
9.1   Describe the operation of encoder, priority encoder and decoder circuit.
9.2   State the principle of operation of LCD, seven-segment display and dot matrix display.
9.3   Describe the operation and application of commonly available encoder & decoder.
9.4   Describe the operation of commonly used 4-bit BCD decoder/driver for seven segment display of common anode/cathode type.

10   Understand the features of multiplexers and demultiplexers.
10.1   Define multiplexers and demultiplexers.
10.2   Describe the operation of 2 and 4 input multiplexer and demultiplexer with logic diagram.
10.3   State the use of multiplexer & demultiplexer.
10.4   State the Pin signals of 2/4 input Multiplexer.
10.5   State the Pin signals of a 1 to 4 line Demultiplexer
10.6   Explain the operation of comparator.
10.7   Describe the Pin diagram of commonly used 4-bit comparator ICs.
10.6   Distinguish between Decoder and Demultiplexer.

SEQUINTIAL LOGIC CIRCUITS

11   Understand the features of sequential logic circuits.
11.1   Define (i) sequential logic circuit (ii) Clock (iii) Timing diagram. (iv) Latch (v) Flip-Flop
11.2   Explain the operation of logic circuit of a basic SR latch.
11.3   Describe the operation of logic circuit of gated SR and D latch with waveform and truth table.
11.4   Mention the difference between latch and flip-flop.
11.5   Give concept of positive & negative edge triggering and level triggering,
11.6   Explain the operation of logic circuit of J-K, D, T and Master-Slave J-K flip-flop with timing diagram and truth table..
11.7   State the function of asynchronous inputs .
11.8   Describe the pin diagram and internal architecture of commonly used flip-flop ICs Such as 74279,7474, 7475, 7476,74112.
11.9   Describe the basic elements in a 555 timer .
11.10   Set up a 555 timer as clock generator.

Practical :

1   To Verify the truth tables of logic gates (OR, AND, NOT)
1.1   Select logic gate ICs.

1.2	Draw the pin diagram and internal connection.
1.3	Select appropriate circuits, required tools, equipments and materials.
1.4	Connect the circuits as per diagram.
1.5	Switch on the DC power supply,
1.6	Verify the truth tables.

2   To Verify the truth tables of logic gates (NAND, NOR gate).

2.1	Select logic gate ICs.
2.2	Draw the pin diagram and internal connection.
2.3	Select appropriate circuits, required tools, equipments and materials.
2.4	Connect the circuits as per diagram.
2.5	Switch on the DC power supply,
2.6	Verify the truth tables.

3   Show the operation of the electronic circuits of basic gates.

3.1	Draw appropriate circuits of basic bates using active and passive components.
3.2	Select required tools, equipments and materials.
3.3	Connect the circuits as per diagram.
3.4	Switch on the DC power supply,
3.5	Verify the truth tables.

4   Verify the Truth table of X-OR & X-NOR gate using basic gates.

4.1	Select logic gate ICs.
4.2	Draw the pin diagram and internal connection.
4.3	Select appropriate circuits, required tools, equipments and materials.
4.4	Connect the circuits as per diagram.
4.5	Switch on the DC power supply,
4.6	Verify the truth tables.

5   To design & develop a code converter circuits and observe its output operation.

5.1	Select logic gate ICs.
5.2	Draw the pin diagram and internal connection.
5.3	Select appropriate circuits, required tools, equipments and materials.
5.4	Connect the circuits as per diagram.
5.5	Switch on the DC power supply,
5.6	Verify the code conversion tables.

6   To Show the operation of NAND gate as universal gates.

6.1	Select logic gate IC of NAND gate.
6.2	Draw the pin diagram and internal connection.
6.3	Select appropriate circuits, required tools, equipments and materials.
6.4	Connect the circuits as per diagram for AND OR & NOT gate.
6.5	Switch on the DC power supply,
6.6	Verify the truth tables of AND OR & NOT gate.

7   To Show the operation of NOR gate as universal gates.

7.1	Select logic gate IC of NOR gate.
7.2	Draw the pin diagram and internal connection.
7.3	Select appropriate circuits, required tools, equipments and materials.
7.4	Connect the circuits as per diagram for AND OR & NOT gate.
7.5	Switch on the DC power supply,
7.6	Verify the truth tables of AND OR & NOT gate.

8   To develop the circuit to proof the Demorgan's theorems.
        8.1   Select logic gate ICs.
        8.2   Draw the pin diagram and internal connection.
        8.3   Select appropriate circuits, required tools, equipments and materials.
        8.4   Connect the circuits as per diagram.
        8.5   Switch on the DC power supply,
        8.6   Verify the theorem.

9   Verify the functions of half adder .
        9.1   Select ICs.
        9.2   Draw the pin diagram and internal connection.
        9.3   Draw appropriate circuits.
        9.4   Select required tools, equipments and materials.
        9.5   Connect the circuits as per diagram.
        9.6   Switch on the DC power supply,
        9.7   Verify the truth tables.

10   Verify the functions of full adder.
        10.1   Select ICs.
        10.2   Draw the pin diagram and internal connection.
        10.3   Draw appropriate circuits.
        10.4   Select required tools, equipments and materials.
        10.5   Connect the circuits as per diagram.
        10.6   Switch on the DC power supply,
        10.7   Verify the truth tables.

11   Verify the output operation of binary 4 bit parallel adder.
        11.1   Select appropriate ICs.
        11.2   Draw the pin diagram and internal connection.
        11.3   Draw appropriate circuits.
        11.4   Select required tools, equipments and materials.
        11.5   Connect the circuits as per diagram.
        11.6   Switch on the DC power supply,
        11.7   Verify the truth tables.

12   Verify the functions of Subtractor .
        12.1   Select appropriate ICs.
        12.2   Draw the pin diagram and internal connection.
        12.3   Draw appropriate circuits.
        12.4   Select required tools, equipments and materials.
        12.5   Connect the circuits as per diagram.
        12.6   Switch on the DC power supply,
        12.7   Verify the truth tables.

13   Verify the output of a 4-bit 2`s compliment subtractor.
        13.1   Select appropriate ICs.
        13.2   Draw the pin diagram and internal connection.
        13.3   Draw appropriate circuits.
        13.4   Select required tools, equipments and materials.
        13.5   Connect the circuits as per diagram.
        13.6   Switch on the DC power supply,

13.7   Verify the truth tables.

14   To Show the operation of encoder .
    14.1   Select appropriate ICs.
    14.2   Draw the pin diagram and internal connection.
    14.3   Draw appropriate circuits.
    14.4   Select required tools, equipments and materials.
    14.5   Connect the circuits as per diagram.
    14.6   Switch on the DC power supply,
    14.7   Verify the truth tables.

15   To Show the operation of decoder.
    15.1   Select appropriate ICs.
    15.2   Draw the pin diagram and internal connection.
    15.3   Draw appropriate circuits.
    15.4   Select required tools, equipments and materials.
    15.5   Connect the circuits as per diagram.
    15.6   Switch on the DC power supply,
    15.7   Verify the truth tables.

16   To Show the operation of a decoder driver & display operation using 7 segment display.
    16.1   Select appropriate ICs.
    16.2   Draw the pin diagram and internal connection.
    16.3   Draw appropriate circuits.
    16.4   Select required tools, equipments and materials.
    16.5   Connect the circuits as per diagram.
    16.6   Switch on the DC power supply,
    16.7   Verify the truth tables.

17   Show the operation of multiplexer.
    17.1   Select appropriate ICs.
    17.2   Draw the pin diagram and internal connection.
    17.3   Draw appropriate circuits.
    17.4   Select required tools, equipments and materials.
    17.5   Connect the circuits as per diagram.
    17.6   Switch on the DC power supply,
    17.7   Verify the truth tables.

18   Show the operation of demultiplexer.
    18.1   Select appropriate ICs.
    18.2   Draw the pin diagram and internal connection.
    18.3   Draw appropriate circuits.
    18.4   Select required tools, equipments and materials.
    18.5   Connect the circuits as per diagram.
    18.6   Switch on the DC power supply,
    18.7   Verify the truth tables.

19   Show the operation of parity generator and detector.
    19.1   Select appropriate ICs.
    19.2   Draw the pin diagram and internal connection.
    19.3   Draw appropriate circuits.

19.4 Select required tools, equipments and materials.
19.5 Connect the circuits as per diagram.
19.6 Switch on the DC power supply,
19.7 Verify the truth tables.

20 Verify the truth table of different S-R flip-flops.
20.1 Select appropriate ICs.
20.2 Draw the pin diagram and internal connection.
20.3 Draw appropriate circuits.
20.4 Select required tools, equipments and materials.
20.5 Connect the circuits as per diagram.
20.6 Switch on the DC power supply,
20.7 Verify the truth tables.

21 Verify the truth table of different J-K flip-flops.
21.1 Select appropriate ICs.
21.2 Draw the pin diagram and internal connection.
21.3 Draw appropriate circuits.
21.4 Select required tools, equipments and materials.
21.5 Connect the circuits as per diagram.
21.6 Switch on the DC power supply,
21.7 Verify the truth tables.

22 Verify the truth table of different D flip-flops.
22.1 Select appropriate ICs.
22.2 Draw the pin diagram and internal connection.
22.3 Draw appropriate circuits.
22.4 Select required tools, equipments and materials.
22.5 Connect the circuits as per diagram.
22.6 Switch on the DC power supply,
22.7 Verify the truth tables.

23 Verify the truth table of different T flip-flops.
23.1 Select appropriate ICs.
23.2 Draw the pin diagram and internal connection.
23.3 Draw appropriate circuits.
23.4 Select required tools, equipments and materials.
23.5 Connect the circuits as per diagram.
23.6 Switch on the DC power supply,
23.7 Verify the truth tables.

24 Construct a Clock generator circuit using 555 timer IC. and observe the output.
24.1 Draw the pin diagram and internal connection.
24.2 Draw appropriate circuits.
24.3 Select required tools, equipments and materials.
24.4 Connect the circuits as per diagram.
24.5 Switch on the DC power supply,
24.6 Observe the on LED or CRO..

REFERENCE BOOKS

1.   Digital Fundamentals
                            -       Thomas L. Floyd
2.   Digital Computer Electronics (An introduction to microcomputers)
                            –   Albert Paul Malvino
3.   Digital Principles
                            –   Roger L. Tokhem
5.   Digital system
                            –   Ronald J. Tocci and Widmer.

6840   INDUSTRIAL POWER ELECTRONICS AND APPLICATIONS

	T	P	C
	3	3	4

AIMS

• To develop the knowledge and skill on using semiconductor diode in power electronics.

• To familiarize with power switching device.

• To develop the knowledge & skill on inverter , Chopper& Cyclocoverter

• To familiarize dc and ac control drive.

• To develop knowledge & skill on steeper motor control & Servo system .

• To develop knowledge & skill on Solar Power system

• To develop the knowledge & skill on high frequency heating and resistance welding.

• To familiarize Microwave heating.

SHORT DESCRIPTION

Power switching devices; Semiconductor diode in power electronics; Inverters, Chopper , Cyclocoverter , Control of ac and dc drives, steeper motor , Photo device, Solar Power system , Induction Heating , Microwave heating,. Resistance welding;

DETAIL DESCRIPTION

Theory :

1   **Understand the Concept of Power Electronics**.
    1.1   Define the term power electronics.
    1.2   Mention the major components of a power electronic system.
    1.3   Describe the working of power electronic system.
    1.4   Mention the scope and application of power electronics.
    1.5   List the merits and demerits of power electronics.
    1.6   Mention the types of power semiconductor devices.

2   **Understand the characteristics of semiconductor diodes in power Electronics**

    2.1   Mention the requirements of Power diode and transistor.
    2.2   Describe the basic structure of power diode.
    2.3   Identify the types of power semiconductor diode.
    2.4   Mention the reverse recovery characteristics of semiconductor diode.
    2.5   Mention the I-V characteristics of series connected diodes.
    2.6   Mention the I-V characteristics of parallel connected diodes.

3   **Understand the features of power Transistor**.

3.1   Mention the types of power transistor.
3.2   Describe the construction and operation of IGBT and SIT.
3.3   Discuss the latch-up in IGBT.
3.4   Describe the I-V characteristics of IGB.
3.5   Analyze the switching characteristics of IGBT.
3.6   Compare IGBT with MOSFET.
3.7   Mention the application of IGBT.
3.8   Describe the construction and operation of MCT.

4   Understand the features of GTO and SITH.

4.1   Describe the construction of GTO and SITH.
4.2   Describe turn-on and turn-off process of GTO and SITH.
4.3   Identify Gold-doped and anode-shorted GTO.
4.4   Compare between GTO and thyristor.
4.5   Mention application of SITH and comparison with GTO.

5   Understand the features of Inverter.

5.1   Define inverter.
5.2   Mention the basic principle of line-commuted and force commuted inverter.
5.3   Describe the operation of single-phase line-commutated full-controlled inverter.
5.4   Describe the operation of three-phase line-commutated full-controlled inverter.
5.5   Describe single-phase parallel-capacitor commutated inverter.
5.6   Describe the operation of single-phase parallel inverter with feedback diodes.
5.7   Describe the operation of single-phase series inverter.
5.8   Describe the operation of three phase forced-commutated bridge inverter.

6   Understand the features of choppers.

6.1   Define chopper.
6.2   Mention the principle of operation of chopper.
6.3   Mention the chopper control technique.
6.4   Describe the operation of voltage step-down chopper.
6.5   Describe the operation of voltage step-up chopper.
6.6   Describe the operation of voltage jones chopper.
6.7   Describe the operation of two quadrants or reversible chopper.

6.8   Describe the operation of two ac chopper.

7   Understand the features of cycloconverter.
7.1   Define cycloconverter.
7.2   Mention the types of cycloconverter.
7.3   Describe the operation of single phase/single phase (mid-point and bridge Configuration) cycloconverter.
7.4   Analyze operation of three phase / single phase (circulating and non circulating type) cycloconverters.
7.5   Describe the operation of a three phase/three phase cycloconverter.

8   Understand the features of dc drives.
8.1   Define electric drive.
8.2   Mention the elements of electric drive using power electronic converter.
8.3   State the basic performance equation of dc motor.
8.4   Explain the principle of operation of single phase (a) Half wave converter drive (b) full wave semiconverter drive, (b) full wave full converter drive (c) duel converter drive.
8.5   Explain the principle of operation of three phase (a) Half wave converter drive (b) full wave semiconverter drive, (b) full wave full converter drive. (c) duel converter drive,
8.6   Explain the operation of two quadrant and four quadrant chopper drive.

9   Understand the feature of stepper motor Control& Servo system .
9.1   Define stepper motor.
9.2   Describe different types of stepper motor.
9.3   Describe the excitation procedure of stepper motor.
9.4   Describe the control of stepper motor.
9.5   Describe the principle of operation and Construction of Dc servo , AC servo .Electrical modulator, hydraulic servomotor and hydraulic modulator
9.6   Describe the basic concepts of DC & AC position control with servo system

10   Understand the the Features of photo resistors , photo diodes and Photo transistors
10.1   Describe the basic structure of photo resistors , photo diodes and photo transistors
10.2   Explain the operating principles of photo resistors , photo diodes and photo transistors.

10.3   Explain the V-I characteristics curve of photo resistors , photo diodes and photo transistors

10.4   List typical application 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 Solar Power System.

11.1   Define Photovoltaic (PV) effect.

11.2   Describe the operation of a solar cell.

11.3   List the materials suitable for solar cell.

11.4   Discuss solar panel.

11.5   Mention the types of PV power system.

11.6   Describe the operation of various types of charge controllers.

12   Understand Electronic Ballast.

12.1   Mention the purpose of Ballast in discharge lamp circuit.

12.2   List the important drawbacks of electromagnetic ballast.

12.3   Describe the general block diagram of electronic ballast.

12.4   Analyze the operation of various types of electronic ballast.

13   Understand the features of induction and dielectric Heating.

13.1   State the theory of induction and dielectric heating.

13.2   Describe the principle of induction and dielectric heating.

13.3   List the effects of frequency on induction and dielectric heating.

13.4   Mention the effects of source voltage on induction and dielectric heating.

13.5   Describe the factors for choosing frequency of induction and dielectric heating.

13.6   List the advantages and applications of Induction and dielectric heating.

13.7   Describe the source of high frequency of induction and dielectric heating.

14   Understand the features of microwave heating.

14.1   Define microwave (MW).

14.2   State the basic principle of microwave heating.

14.3   Mention the frequencies used in MW heating.

14.4   Describe the construction and operation of a Mw oven.
14.5   Explain the energy dispersion system of a MW oven.
14.6   Draw a block diagram of Industrial MW heating equipment.
14.7   Discuss Different types of Applicators.
14.8   List the Industrial applications of MW heating.

15 Understand the features of office and home equipments.

15.1   State the principle of multimedia projector.
15.2   Mention the principle of operation of photo copier with block diagram.
15.3   Explain the principle and operation of laser printer.
15.4   Mention the principle and operation of washing machine.
15.5   Explain the principle and operation of SMPS with block and circuit diagram.
15.6   Explain the principle and operation of UPS and IPS.

16 Understand the features of security system.
16.1   State what is meant by electronic security system.
16.2   Explain the operation of the (smoke) indication system.
16.3   Describe the operation of touch and non touch type person (thief) detector using infrared detection system with block diagram.
16.4   Explain the operation of video monitoring system using multiple monitor switching.

17 Understand th features of resistance welding.
17.1   State the theory of resistance welding.
17.2   Mention the types of welding.
17.3   Describe the basic arrangements of (a) spot welding (b) seam welding (c) but welding.
17.4   Describe block representation o fan ac resistance welding scheme

Practical :

1 Determine the V-I characteristics of series/parallel connected diodes.

2 Determine the V-I characteristics of GTO/IGBT.

3 Determine the V-I characteristics of MCT/FCT.

4 Study the operation of inverter circuit.

5 Study the operation of converter.

6 Construct the step down & step up operation of dc choppers.

7 Study the operation and application of SMPS

8. Study the operation of UPS/IPS.

9 . Study the operation and application of stepper motor control / AC/ DC motor control circuit

10. Study the operation and application of DC servo system

11. Determine the V-I characteristics curve of photo diode .

12. Study the operation and application of Solar power system .

13. Study the operation and application of Electronics ballast/ Microwave heating .

14. Study the operation of Multimedia projector / photo copier / laser printer /Washing machine.

1   Power Electronics Hand Book

-   Muhammad H. Rashid

2   Industrial Electronics and Control

-   Biswanath Paul

3   Industrial and Power Electronics

-   G. K. Mithal
-   Dr. Maneesha Gupta

4   Power Electronics   - Dr. P. S. Bhimbra
5   Introduction to Power Electronics

-   Denis Fewson

6843   NETWORKS, FILTERS & TRANSMISSION LINES

T	P	C
3	3	4

1   AIMS
- To provide the comprehensive knowledge and skill on four terminal network.
- To provide the understanding and skill on attenuator & filters.
- To familiarize with the transmission line.
- To provide the understanding and skill on antenna.
- To familiarize with the propagation of radio waves.

2   SHORT DESCRIPTION

Four terminal networks; Half section network; Attenuators and filters; Transmission line; Line constant & impedance matching; Antenna; Propagation of radio wave; Effect of earth curvature & ionosphere on wave propagation.

3
4   DETAIL DESCRIPTION

Theory :

1   Understand the features of four terminal network.
    .
  1.1   Define network
  1.2   Define the terms (a) Active element (b) passive element (c) linear & non linear element d. Unilateral & Bilateral elements
  1.3   State the classification of networks.
  1.4   Define symmetrical and asymmetrical networks.
  1.5   Illustrate characteristic impedance, propagation constant, attenuation constant and phase constant of general four terminal symmetrical networks connected in services.
  1.6   Illustrate iterative impedance, image impedance, image transfer constant and insertion loss of general four terminal asymmetrical network connected in series.

2   Understand the features of special network.
  2.1   Define recurrent network.
  2.2   Distinguish between the unbalanced and balanced structure ladder network.
  2.3   State the meaning of lattice network.
  2.4   Draw unbalanced and balanced ladder network as series of T, π and L sections.
  2.5   Explain the equivalence between balanced and unbalanced sections.
  2.6   Mention the parameters of four terminal networks.

3   Understand the features of T, f, L and half section networks.

3.1 Express the deduction of the characteristic impedance (Z_O) in terms of lumped impedance (z_1, z_2) of symmetrical T section and π section networks.

3.2 Express the deduction of the Z_O in terms of Z_{OC} and Z_{SC} for T and π section.

3.3 Express the deduction of the propagation constants in terms of z_1 and z_2 for T& π section.

3.4 Identify the symmetrical T and π section into half section network.

3.5 Express the deduction of the iterative, image, open and short circuit impedance of half section networks.

3.6 Identify the unbalanced and balanced forms of L sections.

3.7 Express the deduction of the iterative and image impedance of L section network.

3.8 Draw the T as star and π as a mesh network.

4 Understand the features of resonance circuit .
  4.1 Define resonance circuit
  4.2 Mention the types of resonance circuit .
  4.3 Analyze series and parallel resonance circuit .
  4.4 Explain graphical representation of series and parallel resonance
  4.5 Define half power point 3-db point resonance frequency ,Upper and lower cut of frequency
  4.6 Derive the equation of Upper and lower cut of frequency in terms of circuit parameter .
  4.7 Explain Q- factor .
  4.8 Deduce the equation of Q–factor .

5 Understand the features of attenuators and filter.
  5.1 Define attenuator and filter.
  5.2 Define passive & Active filter.
  5.3 Express attenuation in decibles and nepers.
  5.4 Mention the general characteristics of attenuating network.
  5.5 Show mathematically the attenuators involving symmetrical, asymmetrical, L and π type network.
  5.6 Explain the variable and ladders attenuator.
  5.7 List the types of filters.
  5.8 Mention the general properties of lowpass, highpass, bandpass and bandstop filters.
  5.9 Mention the application of lowpass, highpass, bandpass and bandstop filters.
  5.10 Represent the lowpass filter in symmetrical unbalanced and balanced T-section and symmetrical unbalanced and balanced π section forms.
  5.11 State the theorem connecting alpha and Z_O.

6 Understand the features of special filter.
  6.1 Explain the cut off frequency and constant K-section of filter network.
  6.2 Mention the reactance frequency characteristics of T and π lowpass and highpass filters.
  6.3 Identify the attenuation vs. frequency, phase shift vs. frequency, characteristic impedance vs. frequency curve.

6.4   Mention the significance of T and π section low and highpass filters.
6.5   Express the deduction of M-derived filters.
6.6   Explain the operation of crystal filters.
6.7   Describe the impedance matching of filters.
6.8   Mention the difference between active and passive filters.

7   Understand the features of transmission line.
7.1   Identify the types of transmission lines.
7.2   List the application of transmission lines.
7.3   Explain the velocity of propagation and characteristics impedance of transmission line.
7.4   Define infinite line.
7.5   Explain the short line terminated in Z_O.
7.6   Explain the current and voltage wave along a transmission line.
7.7   Mention the propagation, attenuation and phase constant of a transmission line.
7.8   Describe the voltage, current and power reflection of transmission line.

8   Understand the features of line constant & impedance matching.
8.1   State the meaning of the terms primary and secondary line constants.
8.2   Express the deduction of secondary line constant such as alpha, beta, gamma and Zo in terms of primary line constants.
8.3   Express the deduction of the condition of minimum attenuation, minimum distortion and distortionless condition of transmission line.
8.4   Describe continuous loading and lumped loading.
8.5   List the use of continuous loading and lumped loading.
8.6   Describe the construction of loading coils.
8.7   Mention the use of loading coils.
8.8   Explain the input impedance of transmission line.
8.9   Explain the impedance matching, single stub, double stub and quarter wave transformer.
8.10   Mention the characteristics of the high frequency transmission line.

9   Understand the features of antenna.
9.1   State the physical idea of radiation of electromagnetic energy from antenna.
9.2   Define point source, power gain directivity, aperture, effective area, radiation pattern, beam angle, radiation angle, beam and radiation distance related to antenna.

10   Understand the construction & operation of antenna.
10.1   Describe the construction of dipole, folded dipole, yagi, marconi and whip antenna.
10.2   Describe the operation of dipole, folded dipole, yagi, marconi and whip antenna.
10.3   Describe the radiation pattern of dipole, folded dipole, yagi, marconi and whip antenna.
10.4   Describe the construction of V, rombic, parastic and turnstill antenna.
10.5   Describe the operation of V, rombic, parastic and turnstill antenna.
10.6   Explain the construction of end-fire and broad-side array.
10.7   Explain the operation of end-fire and broad-side array.

10.8 Describe the design of dish antenna.
10.9 Mention the coupling and impedance matching procedure of antenna.
10.10 Explain the construction of the log periodic antenna.

11 Understand the propagation of radio waves.
11.1 Mention the nature of electromagnetic waves.
11.2 Mention the characteristics including polarization of electromagnetic waves.
11.3 Mention the modes of radio wave propagation.
11.4 Mention the classification of radio wave on the basis of frequency, distance and application.
11.5 Mention the characteristics of ground, space and sky wave propagation.
11.6 Explain the summerfield equation and effect of terran for ground wave propagation.
11.7 State the effect of environment in propagation of waves.
11.8 Describe the field strength and range of propagation in terms of antenna height for space wave propagation.

12 Understand the effect of earth curvature & ionosphere on wave propagation.
12.1 Mention the effect of earth curvature and atmosphere on space wave propagation.
12.2 Explain the duct propagation, multi-hop propagation and trophoscatter propagation.
12.3 Explain the term ionosphere.
12.4 Identify the layers of ionosphere.
12.5 List the basic properties of different layers of the ionosphere.
12.6 Explain the reflection and refraction through ionosphere.
12.7 Describe the ionosphere variation and effects of earths magnetic fields.
12.8 Define skip distance, skip zone and M. U. F.
12.9 Explain the fading and noise in sky wave propagation.

Practical :

1 Measure the characteristic impedance of a symmetrical T network.
1.1 Select the required components, connecting board, meter and necessary materials.
1.2 Build up a diagram of symmetrical T network.
1.3 Set the components on the board as per diagram.
1.4 Check the connections.
1.5 Find the characteristic impedance.
1.6 Compare the observed result with theoretical value.

2 Measure the image impedance of a given asymmetrical T network.
2.1 Select the required components.
2.2 Select the connecting board, meter and materials.
2.3 Select a circuit diagram.
2.4 Set the components on the board according to the circuit diagram.
2.5 Check the connections.
2.6 Record the characteristic impedance.

2.7   Compare the observed result with theoretical value.

3   Measure the attenuation of symmetrical T type attenuator.
3.1   Select the attenuator circuit.
3.2   Select the components, meters, board and materials.
3.3   Connect the components of the board as per diagram.
3.4   Check the connections.
3.5   Record the required data.
3.6   Calculate the attenuation.

4   Determine the impedance characteristics of prototype lowpass filter.
4.1   Select a T or π lowpass filter circuit.
4.2   Select the component board, tools and materials.
4.3   Connect the components according to the diagram.
4.4   Record the impedance for various frequency.
4.5   Draw the reactance frequency curve from the data.
4.6   Show the pass band and attenuation band.

5   Determine the attenuation characteristics of a prototype lowpass filter.
5.1   Select the required circuit.
5.2   Select the components, board, meter and materials.
5.3   Connect the circuit components as per diagram.
5.4   Energize the circuit.
5.5   Record the required data for various frequencies.
5.6   Calculate the attenuations by collected data.
5.7   Draw the attenuation frequency curve from the data.
5.8   Observe the graph.

6   Determine the impedance characteristics of a highpass filter.
6.1   Select a high filter circuit.
6.2   Select the components, board, meter and materials.
6.3   Connect the components and energize the circuit.
6.4   Record the impedance for various frequencies.
6.5   Draw the reactance frequency curve.
6.6   Show the pass band and attenuation band.

7   Determine the attenuation characteristics of a high pass filter.
7.1   Select the required circuit.
7.2   Select the components, board, meter and materials.
7.3   Connect the components as per diagram.
7.4   Collect the required data for various frequencies.
7.5   Calculate the attenuations by collected data.
7.6   Plot the graph.

8   Measure the velocity of propagation through a parallel wire transmission line.
8.1   Select a parallel wire transmission line.
8.2   Select the required equipment and tools.
8.3   Use a proper reactance meter to measure the inductance and capacitance per mile.

8.4 Use the formula $V=\dfrac{1}{\sqrt{LC}}$ to measure the inductance and capacitance per loss less line.

8.5 Add the correction factor due to loss.

9 Measure the attenuation constant, phase constant and propagation constant of transmission line.
9.1 Select a transmission line.
9.2 Select the required equipment, tools and materials.
9.3 Find the line constants using proper tools.
9.4 Calculate the attenuation and phase constant from the data.
9.5 Calculate the propagation constant from alpha and beta.

10 Measure the characteristic impedance of a transmission line.
10.1 Select a transmission line.
10.2 Select the required equipment, tools and materials.
10.3 Connect the meter to measure required line constant.
10.4 Calculate the characteristic impedance from line constants.

11 Design and verify the impedance matching of transmission with a quarter wave transformer.
11.1 Select a transmission line with given R_l and Zo.
11.2 Select required equipment and tools for verification.
11.3 Design the quarter wave transformer using formula $R_o = \sqrt{R_2 Z_o}$
11.4 Connect the quarter wave transformer between load and transmission line.
11.5 Observe the matching with the energy transmission.

12 Determine the radiation pattern of dipole antenna.
12.1 Select a source (test antenna), receiver, indicator, power supply, mounting frame.
12.2 Select the required equipment and tools.
12.3 Connect the radiotor dipole with the power supply and receiver to the indicator.
12.4 Place the source and radiotor in the flexible mounting frame.
12.5 Energize the system.
12.6 Rotate the receiver at constant radius around the source.
12.7 Record the power received by the indicator.
12.8 Plot the output versus angular location curve.
12.9 Find the radiation pattern.

13 Construct of an yagi antenna.
13.1 Select the folded dipole, director and reflector of the antenna.
13.2 Select the required equipment, tools and materials.
13.3 Build up the antenna element with proper design data.
13.4 Connect the antenna with transmission line to the TV receiver.
13.5 Observe the receiver output.

REFERENCE BOOKS

1 Network, Filters and Transmission Lines
— P. K. Jain
2 Electronics and Radio Engineering
— M. L. Gupta

6842 **COMMUNICATION ENGINEERING-I** T P C
                    3 3 4

AIMS

  To provide the students with an opportunity to acquire knowledge, skill and attitude in the area of communication engineering with special emphasis on :

- Signals and systems
- Modulation and demodulation
- Radio transmitter and radio receiver,
- Telephone system,
- Transmission media,
- Digital data transmission,

SHORT DESCRIPTION

Concept of basic communication system, Noise, Modulation/Demodulation, Radio transmitter and receiver, Shift keying, Telephone system, Transmission media, Digital communication, Data transmission,

DETAIL DESCRIPTION
Theory :

1 **Understand the signals and spectra**
  1.1 Describe electromagnetic wave and energy.
  1.2 Describe the allocation of frequency bands for various communication system.
  1.3 Explain the nature of different signals and their frequency ranges.
  1.4 Define information.
  1.5 Describe the basic building block of a communication system.
  1.6 Define baud.
  1.7 Describe bandwidth and information capacity.
  1.8 Describe the factors affecting the channel capacity.

2 **Understand the Noise in telecommunication system**.
  2.1 Define noise.
  2.2 Mention the different types and sources of noise.
  2.3 Describe the different noise.
  2.4 Define Signal-to-Noise ratio.
  2.5 Describe the noise figure.

3 **Understand Amplitude modulation**
  3.1 Define modulation.
  3.2 Mention the need for modulation.
  3.3 Define Amplitude modulation.
  3.4 Describe the basics of AM modulation.
  3.5 Derive the expression of AM modulation.

3.6 Define modulation index and depth of modulation.
3.7 State the relative power distribution in carrier and side bands.
3.8 Solve problem related with band width and side band power
3.9 Describe the idea of DSB-SC, SSB-SC and V.S.B modulation.

4   **Understand the frequency and pulse modulation**
  4.1 Define frequency modulation.
  4.2 Describe the concept of frequency modulation
  4.3 Derive the expression for frequency modulated wave.
  4.4 Explain the FM spectra and bandwidth.
  4.5 Describe the idea of modulation index, maximum frequency deviation and deviation
       ratio of FM wave.
  4.6 State the method of generation of PPM, PDM and PWM signals
  4.7 Describe the comparison of AM , FM and PM

5   **Understand the feature of AM and FM modulator**
  5.1   Explain the basic operation of collector modulator, base modulator and
        balanced modulator.
  5.2   Describe the principle of SSB-SC generation.
  5.3   Mention the principles of operation of varactor diode modulator.
  5.4   Mention the application of various modulator.

6   **Understand the demodulation of AM waves**
  6.1   Explain the principle of operation of linear diode detector.
  6.2   State the concept of diagonal clipping and empirical formula for RC time
        constant.
  6.3   Understand the synchronous detector and PLL.
  6.4   Explain the basic principle of PLL with block diagram.

7   **Understand the demodulation of FM wave**
  7.1 Explain the basic principle of detection of FM wave.
  7.2 List the methods of FM demodulation.
  7.3 Describe the foster-Seeley discriminator and its working principle.
  7.4 State ratio detector and its advantages over foster-Seeley discriminator circuit.
  7.5 State the function of limiter circuit

8   **Understand the Radio Transmitter**
  8.1 State the classification of radio transmitters in terms of power, frequency, modulation,
       service involved
  8.2 Explain the block diagram of AM transmitter with function of each state.
  8.3 State the difference between high level and low level modulation.
  8.4 Explain the block diagram of stereo FM transmitter with resulting spectrum.
  8.5 Explain the operation of SSB-SC transmitter with block diagram.

9   **Understand the radio receiver**

9.1   Describe briefly the operation of crystal, Tuned radio-frequency receiver and super receiver.
   9.2   Explain the block diagram of super heterodyne AM radio receiver with function of each block and   waveforms at input and output of each block.
   9.3 Define the term frequency and Co channel interference
   9.4   Explain the typical circuit of each block of super heterodyne receiver.
   9.5 Explain a typical IC based AM and FM radio receiver circuit
   9.6 Explain choice, alignment and tracking, IF and band switch of a radio receiver.
   9.7 Explain the sensitivity, selectivity and fidelity.

10   **Understand the feature of Telephone**
      10.1 Describe briefly telegraphy and telephony system.
      10.2 Describe the working principle of telephone handset transmitter and receiver.
      10.3 Define side tone.
      10.4   Mention advantage and disadvantage of side tone.
      10.5   Describe the tones used in automatic telephone.
      10.6   Describe different type of dialing system .
      10.7   Define the terms traffic, busy hour traffic unit, grade of service, availability and erlong's formula.

11.   **Understand the concept of digital communication.**
      11.1   Mention the advantage of digital communication.
      11.2   Describe the sampling theorem
      11.3   Mention the types of sampling.
      11.4   Describe the quantization & coding principle of PNM & PCM
      11.5   Describe the functional diagram of PNM & PCM.
      11.6   Describe the quantization noise, fold-Over noise, Interpolation Noise & error for PCM.
      11.7   Explain the methods of reducing quantization noise, fold-Over noise and Interpolation noise.

12.   Understand the modulation of digital data
      12.1   Understand the modulation of binary data
      12.2   Describe ASK, FSK and PSK
      12.3   List the application of ASK, FSK and PSK techniques in analogue and data communication.
      12.4   Explain the methods of quadrature amplitude modulation(QAM).

13.   **Understand the transmission media**
      13.1   Mention the categories of transmission media.
      13.2   Describe the construction of twisted pair (UTP,STP), coaxial and fiber optic cable.
      13.3   State the characteristics of twisted pair (UTP,STP), coaxial and fiber optic cable.
      13.4   State the application field of twisted pair (UTP,STP), coaxial and fiber optic cable.
      13.5   Advantages and disadvantages of each types of cables.

13.6 Describe the method of radio, microwave and infra red communication system.

13.7 State the characteristics of radio, microwave and infra red communication system.

Practical :

1. **Study the communication signals and spectra.**
    1.1 Select required equipment, tools and materials.
    1.2 Set up the equipment for observing audio frequency signal
    1.3 Observe amplitude, loudness, frequency, tone, wave, shape and sound quality.
    1.4 Observe low frequency sine waves/square waves/triangular waves at different frequencies and note sound quality.
    1.5 Note the relationship between bandwidth and sound quality.

2. **Measure the modulation index for AM wave forms with different combination of modulating and carrier signals(at least four combination)**
    2.1 Select required circuit board , equipment, tools and materials.
    2.2 Connect the circuit and equipment.
    2.3 Input different modulating and carrier signals.
    2.4 Make proper adjustments.
    2.5 Record the required data.
    2.6 Calculate modulation index for each set of data.

3. **Study the working of a DSB modulator with and without carrier suppression.**
    3.1 Select required circuit board , equipment, tools and materials.
    3.2 Setup the equipment for above conditions.
    3.3 Observe the operation.
    3.4 Observe the operation of carrier suppression on power efficiency

4. **Study the working of Frequency modulation.**
    4.1 Select required circuit board , equipment, tools and materials.
    4.2 Set up circuit board and equipment.
    4.3 Input proper signals.
    4.4 Make proper adjustments.
    4.5 Observe FM wave.

5. **Familiarize with the component layout and controls of popular radio receiver.**
    5.1 Select radio receiver, required equipment, tools and materials.
    5.2 Observe different components and their layout.
    5.3 Observe different control knobs.
    5.4 Observe adjustment of different control knobs and the service.

6. **Study the RF amplifier and converter stage of AM radio receiver**
    6.1 Select radio receiver, required equipment, tools and materials.

6.2 Identify the RF and converter stage in the circuit diagram and in the receiver.
6.3 Make the list of the components.
6.4 Trace the circuit in the receiver.

7. **Study the IF and detector section of an AM radio receiver.**
   7.1 Select radio receiver, required equipment, tools and materials.
   7.2 Identify the IF and converter stage in the circuit diagram and in the receiver.
   7.3 Make the list of the components.
   7.4 Trace the circuit in the receiver.

8. **Study the audio stage of an AM radio receiver.**
   8.1 Select radio receiver, required equipment, tools and materials.
   8.2 Identify the stage in the circuit diagram and in the receiver.
   8.3 Make the list of the components.
   8.4 Trace the circuit in the receiver.

9. **Measure the DC and AC voltages at different points of a super heterodyne radio receiver.**
   9.1 Select radio receiver, required equipment, tools and materials.
   9.2 Observe the circuit diagram and select the test points.
   9.3 Measure the voltage at various points .
   9.4 Prepare a voltage chart for observed voltage.
   9.5 Compare the observed voltage with the given values in the diagram.

10. **Demonstrate the process of alignment of AM radio receiver**
    10.1   Select AM radio receiver, required equipment, tools and materials.
    10.2   Identify the components of alignment.
    10.3   Process the alignment from output to input with half (middle) way setting.
    10.4   Observe the tone.
    10.5   Make realignment for better output.

11. **Demonstrate the process of alignment of FM radio receiver**
    11.1   Select FM radio receiver, required equipment, tools and materials.
    11.2   Identify the components of alignment.
    11.3   Process the alignment from output to input with half (middle) way setting.
    11.4   Observe the tone.
    11.5   Make realignment for better output.

12. **Study the operation of pulse code modulator**
    12.1   Select pulse code modulator and required tools and materials.
    12.2   Identify different parts and note its function.
    12.3   Input an analogue signal.
    12.4   Observe the digital output.
    12.5   Observe different operation of demodulator.

13.   **Study the operation of pulse code modulation**

13.1   Select the circuit and required tools and materials.
13.2   Identify different parts and note its function.
13.3   Input pulse code (digital) signal.
13.4   Observe the analogue output.
13.5   Observe different process of operation.

14. Identify different types of guided communication media (UTP, STP, Co-axial, fiber optic cable) , types of connectors and accessories used with them and observe their constructional features.

References Books

1. Electronic communication systems – William Schweber

2. Electronic communication systems – Kenedy, Devis

3. Electronic communication - Dennis Roody, John Coolen

4. Principles of communication engineering – Anok Singh & A.K Chhabara

5. Principles of telephony - N.N. Biswas

6. Digital Telephony – John Bellamy

7. Radio Engineering – G.K Mithal

6632 **Computer Application -II** T P C
  0 6 2

OBJECTIVES

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

SHORT DESCRIPTION

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

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

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

DETAIL DESCRIPTION

SPREAD SHEET ANALYSIS PACKAGE:

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

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

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

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

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

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

7   Format a worksheet.
7.1   Change the width of a column, a range of column, and change the columns width globally.
7.2   Insert blank columns and blank rows in a worksheet.
7.3   Delete columns and blank rows in a worksheet.

7.4   Format the display of data of a worksheet globally or by referring a range of cells (e.g. currency format, exponential format, comma format, etc.).

7.5   Format the display of data and of a worksheet globally or referring of cells.

7.6   Protect worksheet, function, formula, important text and unprotect a range for entering entries.

7.7   Work with window for viewing worksheet in different ways and freeze rows or columns.

7.8   Create, change and delete a style.

8   Exercise on Sorting, Searching and Worksheet Printing.

8.1   Create a database program

8.2   Sort a database in different ways.

8.3   Search a record from the database using search criteria.

8.4   Extract records from the database that match a given criteria.

8.5   Delete records that a given criteria from the database using available database commands.

8.6   Show the Print Preview and adjust Page setup option.

8.7   Create and use page headers of footers.

8.8   Set print area, print titles and different print option

8.9   Print portion of worksheet and multiple worksheets

8.10   Print ranges from different worksheets on the same pages.

9   Create and Print graphs.

9.1   Create bar, line, X-Y and pie graphs.

9.2   Add color, titles, legend, gird and levels to the graph.

9.3   Add visual impact with colors.

9.4   Create linked pictures.

9.5   Save the graph and assign names to different graphs of a single worksheet.

9.6   Print graphs (low or high quality graphs.)

9.7   Plot graphs using a plotter using different colors.

9.8   Change graphs size, print & plot them.

10   Create Macros and using macro commands.

10.1   Create simple macros (e.g. to change the width of a cell, to format a cell display, to erase a range of cells etc.) using keystroke commands.

10.2   Create a macro to convert values into labels vice versa.

10.3   Create a macro for inserting blank rows between two rows of data in a worksheet.

10.4   Create a macro for deleting the inserted blank rows in a worksheet.

DATABASE MANAGEMENT PACKAGE:

11   Create the new database.
     11.1   Identify the practical database in real world.
     11.2   Identify the fields and records of a database.
     11.3   Identify the different phases of database design.
     11.4   Collect the data form a typical field.
     11.5   Determine the category of a typical field.
     11.6   Design a typical Paper- pencil database form raw data.
     11.7   Run a generalized database management package and identify its display Screen
     11.8   Identify the different options of the selected packages.
     11.9   Use the on-screen help facilities of DBMS package
     11.10 Create and save the table structure.

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

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

14   Create the customized data entry form.
     14.1   Draw a typical data entry screen with paper-pencil work.
     14.2   Design the screen with all fields.
     14.3   Move the field to make the entry form logical and easy to use.
     14.4   Change the field width.
     14.5   Add or delete field (if necessary).
     14.6   Change the display characteristics of fields.
     14.7   Use picture functions template and range to format the displayed data.

14.8   Use different options and commands in design menu.
14.9   Draw lines and boxes on the form.

15   **Create the query.**
     15.1   Display and identify query design screen.
     15.2   Build a simple query
     15.3   Save & apply the query.
     15.4   Use the query design menu options.
     15.5   Use the symbols and operators to build query.
     15.6   Search the records with matching on two or more fields.
     15.7   Select the records within range using range operators.
     15.8   Find the records with inexact and complex matching.
     15.9   Sort the records within queries.

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

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

DATABASE MANAGEMENT LANGUAGE:

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

18.11   Use commands to display or print text.

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

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

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উদ্দেশ্য

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

সংক্ষিপ্ত বিবরণী

ইতিহাস

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

সংস্কৃতি

সংস্কৃতির সংজ্ঞা, আদিযুগে বাংলার সমাজ-সংস্কৃতির রূপরেখা, সুলতানী, মোঘল ও নবাবী আমলের বাংলার সমাজ সংস্কৃতি; ইংরেজ আমলে বাংলার সমাজ ও সংস্কৃতি।
রবীন্দ্র ও 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 উলেণ্ঢখ 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 আর্থ-সামাজিক ব্যবস্থা বর্ণনা করা।

২. বাংলাদেশে গুপ্ত, রাজা শশাঙ্ক, পাল ও মুসলিম শাসন সম্পর্কে অবগত হওয়া।
২.১ গুপ্ত শাসন আমলে বাংলার শাসনব্যবস্থা বর্ণনা করা।
২.২ রাজা শশাঙ্কের রাজ্য বিজয় ও শাসন বর্ণনা করা।
২.৩ বাংলার অরাজকতা ও হিউয়েনসাং এর আমলে বাংলার অবস্থা বর্ণনা করা।
২.৪ গোপাল কর্তৃক অরাজকতার অবসান ঘটানোর কৃতিত্বের বর্ণনা করা।
২.৫ বাংলাদেশে মুসলমানদের আগমন ও বখতিয়ার খলজীর বাংলা বিজয় বর্ণনা করা।
২.৬ বাংলাদেশে স্বাধীন সুলতানী শাসন প্রতিষ্ঠায় শামছুদ্দিন ইলিয়াশ শাঞ্চীর 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 উল্লেণ্ঢখ করা।
৩.৪ ১৯০৫ সালের বঙ্গভঙ্গ আন্দোলন ও ফলাফল ব্যখ্যা করা।
৩.৫ হাজী শরীয়ত উল্লাহর ফরায়েজী আন্দোলন ও এর ফলাফল ব্যখ্যা করা।

৪. বঙ্গভঙ্গউত্তর রাজনীতি ও দেশ বিভাগ সম্পর্কে অবহিত হওয়া।
৪.১ ১৯৩৭ এর নির্বাচন ও এর বৈশিষ্ট্য উল্লেণ্ঢখ করা।
৪.২ লাহোর প্রস্তাব ব্যক্ত করা।
৪.৩ ১৯৪৩ এর বাংলার দুর্ভিক্ষের কারণ ও এর পূর্বাপর অবস্থা উল্লেণ্ঢখ 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 রাজৈনতিক 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 অভ্যুথান, আইয়ুব বিরোধী আন্দোলন ও ৬ দফা দাবী, আগরতলা ষড়যন্ত্র মামলার ইতিবৃত্ত বর্ণনা করা এবং পূর্ব-পশ্চিম পাকিস্তানের অর্থনৈতিক বৈষম্যের খতিয়ান উল্লেণ্ঢখ করা।
৫.৪ ১৯৬৯ সালের গণঅভ্যুথান 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 উল্লেঢখ করা।
৯.২ ১৯৫২ সালের ভাষা আন্দোলনের সাংস্কৃতিক গুরুত্ব উল্লেঢখ করা।
৯.৩ ঢাকা কেন্দ্রিক শিল্পী-সাহিত্যিকদের বাংগালী সংস্কৃতি বিনির্মাণের ভূমিকা পালন উল্লেঢখ করা।
৯.৪ '৬৯ এর গণ আন্দোলনে সাংস্কৃতিক কর্মীদের ভূমিকা উল্লেঢখ করা।
৯.৫ বাঙলা একাডেমীর প্রতিষ্ঠা এবং বাংলা ভাষা ও সাহিত্যে এর ভূমিকা উল্লেঢখ করা।
৯.৬ আন্তর্জাতিক মাতৃভাষা দিবস হিসেবে ২১ ফেব্রুয়ারির তাৎপর্য ব্যক্ত করা।
৯.৭ ভাষা, শিল্প সাহিত্য চর্চায় সংবাদপত্র ও ইলেকট্রনিক মিডিয়ার ভূমিকা উল্লেঢখ 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 প্রত্ন তাত্ত্বিক নিদর্শনের অবদান সম্পর্কে অবগত হওয়া।
১১.১ বাংলাদেশের আদিবাসী সম্পর্কে উল্লেঢখ করা।
১১.২ বাংলাদেশের সংস্কৃতিতে গাড়ো, রাখাইন, সাওতাল, চাকমা আদিবাসীদের সাংস্কৃতিক অবদান ব্যাখ্যা করা।
১১.৩ বাংলাদেশের প্রাচীন সংস্কৃতির ঐতিহ্য হিসাবে মহাস্থানগড়, ময়নামতি ও পাহাড়পুরের প্রত্নতাত্ত্বিক নিদর্শনের বর্ণনা দান।

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5841   BUSINESS ORGANIZATION & COMMUNICATION   T   P   C
**   2   0   2**

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
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.