Electrical Technology (667)
3rd semester

Name of the subject	Subject Code
Electrical Circuits-2	66731
Advance Electricity	66732
Electrical Engineering Drawing	66733
Mathematics-3	65931
Physics-2	65922
Communicative English	65722
Social Science	65811

66731 ELECTRICAL CIRCUITS – II

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Objectives

After completion of these contents students will be able to acquire, achieve and develop:

• To provide knowledge and skill (to apply complex algebra) for AC circuits.
• To acquire knowledge and skills on resonance by varying inductance, Capacitance and frequency.
• To develop concept on Poly phase balanced power system.
• To achieve skills in measuring line and phase quantities in three phase supply.
• To assist in acquainting the concept of poly phase unbalanced power system.
• To develop the concept of non-sinusoidal waves.

SHORT DESCRIPTION

Complex algebra – application to AC circuits; RLC Parallel circuits; Expression for power and VAR; series resonance;

Parallel resonance ; Poly phase system – 3-phase interconnection; Star connected system; Delta connected system;
Balanced Power System; Unbalanced power system; Non-sinusoidal waves.

DETAIL DESCRIPTION
Theory :

1. Understand the application of complex algebra in RLC parallel circuit.
1.1 Compute the value of parameters of RLC parallel circuit in rectangular form of notation and polar form of notation.
1.2 Draw vector diagram of RLC parallel circuit.
1.3 Solve problems on RLC parallel circuit.
1.4 Define admittance, Susceptance and Conductance
1.5 Mention the units of Admittance, Susceptance and Conductance
1.6 Find the impedance, admittance, current and voltage in RLC parallel circuit.
1.7 Draw impedance/admittance triangle of RLC parallel circuit.
1.8 Solve problems on series and parallel AC circuit in rectangular form of notation and polar form of notation.

2. Understand the concept of power calculation on AC circuit.
2.1. Derive the Expression of power employing complex form.
2.2. Calculate VAR employing complex form.
2.3. Explain the conjugate method of calculating Apparent, active & Reactive power.
2.4. Sketch wave diagram for power of different AC circuits.

3. Understand the principle of resonance in series circuit.
3.1 Define resonance.
3.2 Define resonance in series circuit.
3.3 Mention various ways of securing resonance in series circuit.
3.4 Explain resonance curve when varying frequency.
3.5 Determine resonance frequency in series circuit.
3.6 Solve problems on resonance frequency in series circuit.

4. Understand the effect of bandwidth and Q-factor in series resonance.
4.1 Describe the resonance curve and bandwidth in series resonance.
4.2 Explain the effect of frequency upon reactance of the series resonance circuit.
4.3 Show the graphical representation of series resonance.

4.4 Explain resonance curve when varying inductance.
4.5 Explain resonance curve when varying capacitance.
4.6 Define Q-factor of a series resonance circuit.
4.7 List the applications of series resonance.
4.8 Solve problems related to series resonance.

5. Apply the principle of resonance in parallel circuit.
5.1. Define resonance in parallel circuit.
5.2. Describe the resonance curve and bandwidth in parallel resonance.
5.3. Determine the resonance frequency in parallel circuit with R-L and RC branch.
5.4. State the condition for resonance in parallel circuit with L & R in one branch and C only in other.
5.5. Show the graphical representation of parallel resonance.

6. Understand the effect of bandwidth and Q-factor in parallel resonance.
6.1 Define dynamic impedance and current magnification.
6.2 Describe the effect of Q-factor and bandwidth in parallel resonance circuit.
6.3 List the applications of series and parallel resonance.
6.4 Derive mathematical deduction of the exact and approximate formula for parallel resonance.
6.5 Compare resonance in series circuit with that in parallel circuit.
6.6 Solve problems on parallel resonance.

7. Understand the concept of poly phase power system.
7.1. Explain the term poly phase system.
7.2. List the advantages of poly phase power system over single-phase power system.
7.3. Discuss the generation of poly phase emf.
7.4. Sketch the wave diagram for a poly phase power system.
7.5. Draw vector diagram for a poly phase power system.

8. Understand the concept of expressing poly phase power system.
8.1. Describe the meaning of double subscript notation.
8.2. Identify the phase sequence of poly-phase system.
8.3. State the effects of reverse phase sequence.
8.4. Explain the methods of checking phase sequence.
8.5. Sketch the phase sequence diagram of 3-phase power system.

9. Understand the concept of poly phase for interconnection.

9.1. Express possible ways of interconnection of 3-phase power system.

9.2. Sketch the circuit diagram of star connected 3-phase 3-wire system.

9.3. List the application of 3-phase 3-wire star connected power system.

9.4. Sketch the circuit diagram of 3-phase 4-wire star connected power system.

9.5. List the application of 3-phase 4-wire star connected power system.

9.6. Draw the vector diagram of 3-phase 4-wire star connected power system.

9.7. Derive the relation between line and phase voltage and current in a balanced 3-phase 3-wire star

connected power system.

9.8. Derive the relation between line and phase voltage and current in a balanced 3-phase 4-wire star

connected power system.

10. Understand the concept of star connected power system.

10.1. Identify neutral wire in a 3-phase4-wire star connected system.

10.2. Express the current in the neutral wire in an unbalanced 3-phase 4-wire star connected system.

10.3. Draw the phasor diagram of 3-phase 4-wire star connected system.

10.4. Derive the formulae $I_L = I_P$ and $V_L = 3 V_p$

10.5. Calculate volt-ampere, power and power factor in a balanced 3-phase 4-wire star connected

power system.

10.6. Solve problems on star connected (balanced and unbalanced) power system.

11. Understand the concept of delta connected power system.

11.1. Sketch the circuit diagram of 3-phase delta connected power system.

11.2. Draw the vector diagram of a 3-phase delta connected power system.

11.3. Express the deduction of the formula $V_L = V_P$ and $I_L = 3 I_P$ for delta connected power system.

11.4. Enumerate the relation between line and phase current & voltage in a delta connected power

system.

11.5. Calculate the volt-ampere, power and power factor in a 3-phase delta connected power system.

11.6. Compare the advantages of star connected system with those of delta connected power system.

11.7. Solve problems on delta connected balanced power system.

12. Understand the concept of unbalanced power system.

12.1. Express the meaning of unbalanced power system.

12.2. State and Explain Fortescue`s theorem.

12.3. Explain the positive sequence of power system.

12.4. Explain the negative sequence of power system.

12.5. Explain the zero sequence of power system.

12.6. Explain the neutral current of unbalanced system.

12.7. Solve problems related to unbalanced system.

13. Understand the principle of non sinusoidal waves.

13.1 Define non-sinusoidal waves.

13.2 Explain non-sinusoidal waves as the sum of sine and cosine waves of different frequencies with

graphical and mathematical representation.

13.3 Define harmonics.

13.4 Explain harmonics in the **Y**-system.

13.5 Explain harmonics in the -system

13.6 Calculate effective value of non-sinusoidal wave.

13.7 Explain power due to non-sinusoidal voltage and current.

13.8 Calculate volt-amperes due to non-sinusoidal voltage and current.

14. Understand power factor of non-sinusoidal waves.

14.1 Explain power factor due to non-sinusoidal waves.

14.2 Explain equivalent sine wave of non-sinusoidal wave.

14.3 Explain addition and subtraction of non-sinusoidal wave.

14.4 Solve problems related with non-sinusoidal wave.

Practical :

1. Determine resonance frequency and draw resonance curve from RLC series circuit. by changing frequency ,

Inductance, Capacitance.

1.1 Sketch the circuit diagram for RLC series resonance.

1.2 Select tools, equipment and materials for the experiment.

1.3 Connect the circuit according to the sketch.

1.4 Check all connection points before actual operation.

1.5 Record the readings from the meter applying power supply to the circuit.

1.6 Find the value of current, resistance, inductive reactance, capacitive reactance and impedance.

2. Determine resonant frequency in RLC parallel circuit and draw of resonance curve.

2.1 Sketch the circuit diagram for RLC parallel resonance.

2.2 Select tools, equipment and materials for the experiment.

2.3 Connect the circuit according to the sketch.

2.4 Check all connection points before actual operation.

2.5 Record the data from the meter applying power supply to the circuit.

2.6 Find current, resistance, inductive reactance, capacitive reactance and impedance.

2.7 Sketch the resonance curve with the frequency as abscise and current, resistance, inductive reactance,

capacitive reactance and impedance as ordinate.

3. Demonstrate poly-phase system and phase sequence.

3.1 Sketch the circuit diagram of poly-phase system and phase sequence.

3.2 Select tools, equipment and materials for the experiment.

3.3 Switch on the poly-phase system of your laboratory.

3.4 Measure the phase voltages by voltmeter.

3.5 Observe the phase voltages by oscilloscope.

3.6 Compute phase sequence.

3.7 Note down the observations.

4. Measure line and phase voltage & current in 3-phase 4-wire star connected inductive load.

4.1 Sketch the circuit diagram for 3-phase star connected load.

4.2 Select the tools, Equipment and materials required for the experiment.

4.3 Connect the circuit according to the circuit diagram.

4.4 Check all connection points before connecting the power supply to the circuit.

4.5 Record the readings of the instruments.

4.6 Compare the recorded values with calculated values.

4.7 Note down the observations.

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 List the tools, equipment and materials required for the experiment.

5.3 Connect the circuit according to the circuit diagram.

5.4 Check all connection points before connecting the power supply to the circuit.

5.5 Record the readings of instruments.

5.6 Compare the recorded values with calculated values.

5.7 Note down the observations.

6. Construct vector diagram by measuring current, voltage and power in a balanced 3-phase star connected inductive load.

6.1 Sketch the circuit diagram for measuring power by 3-watt meters of a 3-phase star connected system.

6.2 Select tools, equipment and materials required for the experiment.

6.3 Connect the circuit according to the circuit diagram using proper equipment.

6.4 Check all connection points, equipment and instruments before actual operation.

6.5 Record the readings from the meters connected in the circuit.

6.6 Calculate the power from the formula Pt = W1 + W2 + W3 and 3VpIp Cos θ

6.7 Draw the vector diagram using relevant data as obtained.

6.8 Note down the observations.

7. Construct vector diagram by measuring current, voltage and power in a balanced 3-phase delta connected inductive load.

7.1 Sketch the circuit diagram for measuring power by 3-watt meter method in a 3-phase delta connected load.

7.2 Select tools, equipment and materials for the experiment.

7.3 Connect the circuit according to the circuit diagram.

7.4 Check all connections before actual operation.

7.5 Record the reading from the meters used in the circuit.

7.6 Calculate the power from the formula Pt = W1 + W2 + W3 and Pt = 3 VLIL Cosθ

7.7 Draw the vector diagram using relevant data.
7.8 Note down the observations.

8. Measure power and neutral current in a 3-phase, 4-wire unbalanced system.
8.1 Sketch the circuit diagram for measuring power and neutral current in 3-phase 4-wire unbalanced
load.
8.2 Select tools, equipment and materials for the experiment.
8.3 Construct the circuit according to the circuit diagram.
8.4 Check all connections & instruments before actual operation.
8.5 Record the readings from the meters used in the circuit.
8.6 Calculate the power and neutral current.
8.7 Calculate the phase angles.
8.8 Note down the observations.

9. Measure line and phase voltage and current of a 3-phase star connected capacitive load.
9.1 Sketch the circuit diagram for measurement of line and phase voltage and current of a 3-phase
star connected capacitive load.
9.2 Select tools, equipment and materials required for the experiment.
9.3 Construct the circuit as per diagram with proper instrument.
9.4 Record the readings from the meters used in the circuit.
9.5 Calculate the line and phase voltage & current from the formula $I_L = I_P$ and $V_L = 3V_P$
9.6 Note down the observations.

10. Measure line and phase current and voltage in 3-phase delta connected capacitive load.
10.1 Sketch the circuit diagram for measuring line and phase voltage and current of a balanced 3-phase delta connected capacitive load.
10.2 Select tools, equipment and materials required for the experiment.
10.3 Build up the circuit according to the circuit diagram.
10.4 Record the readings from the meters.
10.5 Calculate the line and phase voltage and current from the formula $V_L = V_P$ and $I_L = 3I_P$.
10.6 Note down the observations.

11 Measure 3-phase power by 3-watt meter method in a balanced 3-phase star connected capacitive load.

11.1 Sketch the circuit diagram for measuring 3-phase power by 3-watt meter method of a balanced 3-phase star connected capacitive load.

11.2 Select tools, equipment and materials required for the experiment.

11.3 Build up the circuit according to the circuit diagram.

11.4 Check all connections before actual operation.

11.5 Record the readings from the meters.

11.6 Calculate the power from the formula Pt = W1 + W2 + W3 and Pt = 3 VLILCosθ

11.7 Draw the vector diagram using relevant data as obtained.

11.8 Note down the observations.

12. Measure 3-phase power by 3-watt meter method in a balanced 3-phase delta connected capacitive load.

12.1 Sketch the circuit diagram for measuring 3-phase power by 3-watt meter method in a balanced 3-phase delta connected capacitive load.

12.2 Select tools, equipment and materials required for the experiment.

12.3 Connect the circuit according to the circuit diagram.

12.4 Check all connection points before connecting to the power supply.

12.5 Record the readings from the meters.

12.6 Calculate the power from the formula Pt = W1 + W2 + W3 and Pt = 3 VLILCosθ

12.7 Draw the vector diagram using relevant data as obtained.

12.8 Note down the observations.

13. Perform star-delta conversion in a power system.

13.1 Draw the circuit diagram of a balanced 3-phase star and delta connection.

13.2 Select tools, equipment and materials for the experiment.

13.3 Build up the circuit for star connection.

13.4 Check all connection points before actual operation.

13.5 Record the readings from the meters connected in the circuit.

13.6 Calculate the equivalent values of impedance in delta connection.

13.7 Build up a circuit with equivalent values of impedance in delta connection.

13.8 Record the reading for delta connection.

13.9 Compare the result.

13.10 Note down the observations.

66732 ADVANCE ELECTRICITY

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OBJECTIVES

After completion of these contents students will be able to acquire, achieve and develop:

• To acquire knowledge and skills of Electrical house wiring.
• To develop the capacity to know constructional details and working principles of electric lamps.
• To develop understanding about earthing.
• To develop understanding about controlling and protective devices.
• To acquaint the principles of Electro-magnetic Induction.
• To familiarize Magnetism and magnetization

SHORT DESCRIPTION

Advance wiring; Electric lamps; Earthing; Controlling and Protective devices; Electro-magnetic Induction;
Magnetism and Magnetization; Hysteresis and eddy current loss; Energy stored in magnetic field,

DETAIL DESCRIPTION

Theory:

1 Understand the Basic concept of electrical wiring.

1.1 List the different types of electrical house wiring.
1.2 Describe wiring of the high-rise residential building.
1.3 Describe wiring the high rise commercial building.
1.4 Explain the indoor and outdoor wiring.
1.5 Distinguish between indoor and outdoor wiring.
1.6 Draw the wiring layout plan of a residential building.
1.7 Draw the wiring layout plan of a commercial residential building.
1.8 Describe the electrical symbols used in electrical wiring.

2 Understand the constructional details and working principles of different types of traditional electric

lamps.

2.1 Mention name of the different types of lamps.

2.2 Explain the working principle of tungsten filament lamp .

2.3 Describe constructional details of tungsten filament lamp.

2.4 Explain the working principle of a fluorescent lamp describing the function of the choke coil and
starter.

2.5 Discuss advantages and disadvantages of fluorescent lamp.

2.6 Describe the detail circuit diagram of an electronically controlled fluorescent lamp.

2.7 Discuss the advantages of electronically controlled fluorescent lamp.

3 Understand the constructional details and working principles of modern electric lamps.

3.1 Explain the working principle of Sodium Vapour and Mercury Vapour lamps with circuit diagram.

3.2 Explain constructional details of Sodium Vapour & Mercury Vapour lamps.

3.3 List the uses of Sodium Vapour and Mercury Vapour lamps.

3.4 Explain working principle of a Compact Fluorescent lamp with circuit diagram.

3.5 Describe constructional details of a Compact Fluorescent lamp.

3.6 Explain working principle of a Light Emitting Diode (LED) lamp and LED tube light with circuit
diagram.

3.7 Describe constructional details of LED lamp and LED tube light.

3.8 Explain working principle of Liquid Crystal Diode (LCD) lamp with circuit diagram.

3.9 Describe constructional details of LCD lamp.

3.10 Explain working principle of a Cold Cathode Filament lamp (CCFL)with circuit diagram.

3.11 Describe constructional details of a CCF lamp.

4 Understand the construction and uses of controlling and protective devices.

4.1 Explain the meaning and uses of SPST, SPDT, DPST, DPDT, TPST, Sliding switch, MCB and
MCCB.

4.2 Describe the construction of MCB and its advantages.

4.3 Give reasons for the uses of a Lightening Arrester

4.4 Give reasons for the uses of a drop out fuse in distribution system.
4.5 Describe the Internal wiring of Combined socket with switch.
4.6 Describe the construction of Magnetic contactor.
4.7 Explain the Forward- Reverse speed control by using magnetic contactors.

5 Understand the concepts of earthing.
5.1 Discuss the factors to be considered in performing earthing.
5.2 Explain the working principles of pipe earthin with diagram.
5.3 Explain the working principles of plate earthing with diagram.
5.4 Explain the working principles of sheet earthing with diagram.
5.5 Explain the working principles of rod earthing with diagram.
5.6 Describe the principle and operation of earth tester.
5.7 Describe the method of measuring the earth resistance.
5.8 Explain the earth resistance range in different installation.

6 Understand the phenomenon of induced emf.
6.1 Explain dynamically induced emf.
6.2 Deduce the formula of dynamically induced emf.
6.3 Explain self induced emf.
6.4 Define Coefficient of self-induction by First, Second and Third method for self-inductance (L).
6.5 Apply the formula obtained by First, Second and Third Method to find L of iron core.
6.6 Explain Mutual Inductance (M).
6.7 Define coefficient of self-induction by First, Second and Third Method for (M).
6.8 Apply the formula obtained by First, Second and Third method to find out Mutual Inductance (M).
6.9 Solve problems related to dynamically and statically induced emf.

7 Understand the concept of Inductance and Co-efficient of coupling.
7.1 Explain co-efficient of coupling.
7.2 Deduce the expression for co-efficient of coupling.
7.3 Solve problems on mutual inductance and co-efficient of coupling.
7.4 Define the expression for inductance in series.
7.5 Derive the expression for inductance in series.
7.6 Solve problems on inductance in series.

8 Understand the principle of Magnetism and Magnetization.

8.1 Explain magnetization properties of materials.

8.2 Explain cycle of magnetization.

8.3 Draw magnetization (B-H) curve.

8.4 Mention applications of B-H curve.

8.5 State and explain Steinmetz's hysteresis law.

8.6 Derive the formula for hysteresis loss on the basis of the Steinmentz's law.

8.7 Solve problems on hysteresis loss related to Steinmentz's law.

9 Understand the concept of hysteresis loss. and eddy current loss with their minimization

9.1 Define magnetic hysteresis.

9.2 Explain hysteresis loss.

9.3 Explain hysteresis loop.

9.4 Determine areas of hysteresis loop.

9.5 Deduce the expression for energy loss in one cycle of magnetization per cubic meter.

9.6 State the uses of hysteresis loss curves.

9.7 Define eddy current loss.

9.8 Discuss the methods for minimization of eddy current loss.

9.9 Describe the expression for eddy current loss and hysteresis loss.

9.10 Solve problems related to eddy current loss.

10 Understand the concept of energy-stored in a magnetic fields.

10.1 Explain the principle of energy stored in a magnetic field.

10.2 Drive the expression for energy stored in a magnetic field.

10.3 Solve problems related to energy stored in a magnetic circuit.

10.4 Explain the lifting power of electromagnet.

10.5 Mention the application of lifting power of electromagnet.

11 Understand the concept of various kinds of special electrical circuit.

11.1 Describe the working principle and construction of calling bell.

11.2 Explain the working principle and construction of Alarm circuit.

11.3 Describe the working principle and construction of light Dimmer.

11.4 Explain the working principle and construction of Electronic Fan regulator circuit.

11.5 Describe the working principle and construction of Electronic Choke coil.

12 Understand the concept of various kinds of Testing the Electrical House Wiring.
12.1 Mention the different types of test for newly installed electrical house wiring.
12.2 Explain the methods of Continuity test for electrical wiring.
12.3 Describe the method of Polarity test for switches in electrical wiring.
12.4 Describe the methods of short circuit test for electrical wiring.
12.5 Explain the methods of Insulation resistance test for electrical wiring.
12.6 Explain the methods of Earth test for electrical wiring.

Practical:
1 Show skill in connecting one lamp controlled from three different points.
1.1 Sketch a working diagram of one lamp controlled by three SPDT and one DPDT switches.
1.2 Connect the circuit using required materials and equipment in wiring board.
1.3 Test the connection of circuit by applying proper supply.
1.4 Write a report on connecting one lamp controlled from three different points.

2 Show skill in connecting one calling bell with four indicating lamps controlled from four points.
2.1 Sketch the working wiring diagram of one calling bell with four indicating lamps controlled by four
push button switch.
2.2 Connect the circuit using required materials and equipment in wiring board.
2.3 Test the connection of the circuit by applying proper supply.
2.4 Write a report connecting one calling bell with two indicating lamps controlled from two points.

3 Show skill in connecting one lamp, one 2-pin socket and one fan in a circuit by channel wiring.
3.1 Draw the appropriate circuit diagram showing the location of lamp, fan, switches and socket.
3.2 Connect lamp, fan and socket as per drawing.
3.3 Connect the circuit with the supply.

3.4 Switch on the lamp and fan and check the power socket with the help of a test lamp.

3.5 Write a report on connecting one lamp, one socket and one fan in a circuit.

4 Show skill in connecting two fluorescent lamps in parallel in a case/shade and controlled by one switches
separately.

4.1 Draw the appropriate circuit diagram showing two fluorescent lamps in parallel and a one SPST
tumbler switches.

4.2 Wiring of the circuits according to diagram.

4.3 Connect the circuit with the power supply.

4.4 Switched on and observe.

4.5 Write a report connecting two fluorescent lamps in parallel and controlled by one switch.

5 Show skills in performing internal/ wiring and installing a combined socket with switch

5.1 Draw the internal diagram showing the internal connections.

5.2 Connect the internal points as per diagram.

5.3 Install the combined socket.

5.4 Test the function of the combined socket.

5.5 Write a report on installing a combined socket with switch.

6 Show skill in connecting cutout, MCB/MCCB in a circuit.

6.1 Sketch a circuit diagram showing the location of cutout and MCB or MCCB separately with a load
like heater or lamp.

6.2 Connect the cutout/MCB/MCCB with the load as per drawing.

6.3 Connect the circuit with the supply.

6.4 Make necessary overloading the circuit by adding additional/excessive load or by short circuiting the
load.

6.5 Observe the operation of a MCB and MCCB or a cutout.
6.6 Write a report on connecting cutout/MCB/MCCB in a circuit.

8. Show skill in connecting one lamp, one 3-pin socket one fan in a circuit by surface conduit wiring.
8.1 Draw the circuit diagram in a paper
8.2 Draw the layout diagram of wiring on the booth wall.
8.3 Cutting the wall according to diagram with identification of socket, switch board.
8.4 Fix up the conduct pipe on the wall.
8.5 Fastening the wall.
8.6 Draw the proper size of cables or wines.
8.7 Connect the switches, holders.
8.8 Check the whole installation.
8.9 Fitting the loads in proper position.
8.10 Test the wiring.
8.11 Supply and operate the load.

9. Show skill in installation of Plate earthing
9.1 Sketch the proper earthing diagram.
9.2 Estimate the list of materials.
9.3 List the necessary tools, equipment and materials..
9.4 Boring the G-I Plate
9.5 Connect the earthing lead with plate

10. Perform skills for making a electronic calling bell
10.1 Sketch the circuit for making a calling bell.
10.2 List the necessary tools, equipment and materials.
10.3 Connect the materials as per circuit diagram.
10.4 Make and test the calling bell.
10.5 Write a complete report of making the calling bell.

11. Perform skills for continuity test and short circuit test of wiring and polarity test of switches in an
electrical installation
11.1 Sketch the circuit for continuity test and short circuit test of wiring and polarity test of switches.

11.2 List the necessary tools, equipment and materials.

11.3 Connect the materials as per circuit diagram.

11.4 Test continuity of the wiring.

11.5 Test the short circuit of wiring.

11.5 Test the polarity of the switches.

11.6 Write a complete report for continuity test and polarity test.

12. Perform skills for Insulation resistance test and earthing test of electrical installation

12.1 Sketch the circuit for insulation resistance test and earthing test.

12.2 List the necessary tools, equipment and materials.

12.3 Connect the materials as per circuit diagram.

12.4 Test the insulation resistance by using Megger of wiring

12.5 Test the earthing by using earth tester of the wiring.

12.6 Write a complete report for insulation resistance test and earthing test.

66733 ELECTRICAL ENGINEERING DRAWING

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OBJECTIVES

After completion of these contents students will be able to acquire, achieve and develop:

• To acquaint with electrical engineering drawings.

• To develop skill in drawing isometric, oblique and orthographic views.

• To enable to interpret and skill to draw thread and fastening devises.

• To develop skill in drawing the symbols for electrical components and equipment.

• To develop skill in drawing the layout diagram of overhead distribution lines.

• To develop skill in drawing the layout diagram of a small sub-station.

• To enable to interpret the electrical layout diagram of a residential building.

• To enable and skill to draw Electrical circuit, plan with ECAD.

SHORT DESCRIPTION

After completion of these contents students will be able to acquire, achieve and develop: Drawing (elevation,

plan and section) of electrical transmission and distribution line structure; Drawing of symbols used in electrical

planning; Drawing of insulator used in overhead line; Drawing of pole mounted sub-station; Drawing of LT

distribution line; Drawing electrical layout and single line wiring diagram of a small residential building; Using ECAD

in electrical Drawing and circuit.

DETAIL DESCRIPTION
1 Construct first and third angle orthographic views.
1.1 Understand orthographic projection in fast and third angle.
1.2 Choose minimum required number of views and complete orthographic Drawing of

an object..
1.3 Draw three views of an object having hidden features.
1.4 Identify and draw the missing view and missing line in a drawing of a engineering object.

2 Draw Isometric Drawing.
2.1 Understand and draw the isometric drawing.
2.2 Draw an isometric circle.
2.3 Draw oblique views from orthographic views or actual object using isometric scale.
2.4 Put dimensions on isometric drawing.

3 Draw Oblique drawing.
3.1 Understand and draw the oblique drawing.
3.2 Draw an oblique circle.
3.3 Draw oblique views from orthographic views or actual object.
3.4 Put dimensions on oblique drawing.

4 Prepare the d**rawing conventions of thread fastening devices.**
4.1 Draw the threads showing terminologies.
4.2 Draw different types of screw thread profile with correct proportions.
4.3 Draw the square/hexagonal headed bolt and nut with proper proportions showing

conventional and simplified thread form.

5 Prepare the drawings of riveted and welded components.

5.1 Draw the riveted and welded components using conventions and symbols.

5.2 Draw a complete set of riveted joint and welded joint.

6 Develop the drawing of an electrical distribution line structure.

6.1 Draw the elevation, plan and section of a tubular steel pole used in LT distribution line.

6.2 Draw the elevation, plan and section of a concrete pole (RCC/PCC) of the following cross sections.
• Circular
• I-shaped
• Rectangular

6.3 Draw the elevation plan and section of a wooden pole used in rural electrification.

7 Construct the symbols for the equipment, fittings and fixtures commonly used in electrical installations.

7.1 Draw the symbols for the following fittings and fixtures commonly used in electrical installation.
• Lamp (incandescent, fluorescent) • Choke coil
• Lamp outlet • Starter (for tube light)
• Ceiling rose • Cartridge fuse
• Socket outlet • Power outlet
(2-pin & 3-pin) • Calling bell
• Single way switch • MCB
• Two way switch • MCCB
• Intermediate switch • Magnetic contactor
• TP switch • Indicating lamp
• Change over switch • Earthing
• Ceiling fan Micro switch
• Fan regulator • Exhaust fan
• Combined switched socket • Renewable fuse
• Distribution board • Sub distribution board
Draw the symbols for the following equipment used in electrical installation.
• OCB/VCB/CB • Relay
• Transformer • Battery

• Motor (DC, AC) • Limit switch
(3-phase & 1-phase) • Rectifier unit
• Generator • Isolator
• Motor starter • Lightning arrestor

8 Develop the drawing of insulators used in transmission and distribution line.
8.1 Draw the elevation, plan and section of a standard suspension type insulator.
8.2 Draw the elevation, plan and section of a 11 KV pin type insulator.
8.3 Draw the elevation plan and section of a shackle insulator used in LT distribution line.

9 Develop the plan of a pole mounted sub-station.
9.1 Draw the plan of a H-type pole structure.
9.2 Draw a transformer on the middle limb of the structure.
9.3 Sketch the dropout fuses on the top of the transformer.
9.4 Show the gang operated (GO) switch.
9.5 Show the incoming and outgoing lines.

10 Develop the drawing of a LT distribution line (11KV/0.4KV)
10.1 Draw the layout plan of a LT distribution line.
10.2 Draw the section of a pole showing the conductors.
10.3 Identify the line, neutral, earth and street lighting conductors.

11 Construct an electrical layout diagram and circuit diagram of a residential building.
11.1 Draw a layout diagram of a small residential building.
11.2 Show the electrical fittings and fixtures on the layout plan.
11.3 Show the switch boards, distribution boards, energy meter and protective devices in the section plan.
11.4 Sketch the section of the distribution board.
11.5 Sketch the section of a switch board.

12. Set up the drawing environment and drawing aids.
12.1 Start an ECAD Package and identify the different areas of ECAD screen.
12.2 Identify the menu bar, toolbar, drawing area and special windows for circuit simulation and testing
purpose.

12.3 Familiarize with tools, toolkits and buttons (such as arrow, wire, text, delete etc)

12.4 Familiarize with workspace, conventions, preferences, shortcuts and hotkeys.

12.5 Place components such as resistors, transistors, power supply etc.

12.6 Save the drawing environment.

12.7 Exit from the ECAD package.

13. Draw and edit schematic Circuits.

13.1 Place devices (such as resistors, transistors, IC, power supply, grounds etc) in the workspace.

13.2 Reposition devices.

13.3 Edit devices with values and parameters.

13.4 Delete devices (if necessary).

13.5 Wire devices together.

14. Analyze a schematic Circuit.

14.1 Familiarize device meters, value sliders, goal seeker and circuit analyzer.

14.2 Add device meter to circuit diagram and set device meter values.

14.3 View Circuit voltage and current or digital logic level.

14.4 Change a device value and quickly analyze the circuit.

14.5 Perform DC and AC analysis of the circuit using circuit analyzer/oscilloscope.

14.6 Generate and print a frequency response graph.

14.7 Perform Digital analysis of a digital circuit.

14.8 Generate logic level graphs by using digital clock and oscilloscope.

15. Organize the drawing information on layers.

15.1 Identify the layer control options.

15.2 Create and name the layers.

15.3 Make the layer current and control layer visibility.

15.4 Freeze, lock and unlock the layers.

15.5 Set the layer color & line type.

65931 MATHEMATICS -3

T P C
3 3 4

AIMS
• To enable to calculate the areas of regular polygons, hexagons, octagon, hydraulic mean depth
(HMD) of a channel, area occupied by water of circular culvert. Excavation work.
• To provide the ability to calculate volume of regular solids like pyramid frustum of pyramid,
prismoid, wedge and area of curved surfaces.
• To enable to use the knowledge of gradient of a straight line in finding speed, acceleration etc.
• To enable to use the knowledge of conic in finding the girder of a railway bridge, cable of a
suspension bridge and maximum height of an arch.
• To make understand the basic concept and techniques of composition and resolution of vectors
and computing the resultant of vectors.

SHORT DESCRIPTION
Menstruation : Area of rectangles, squares, triangles, quadrilaterals, parallelograms, rhombus,
trapezium, circle, sector, segment; Volume of rectangular solids, prism, parallelepiped, pyramids,
cones, spheres, frustum of pyramid and cone; Area of curved surface of prism, Cylinder cone,
pyramid and frustum of cone.
Co-ordinate Geometry: Co-ordinates of a point, locus and its equation, straight lines, circles and
conic.
Vector: Addition and subtraction, dot and cross product.

DETAIL DESCRIPTION
MENSURATION:
1 Apply the concept of area of triangle.
1.1 Find the area of triangle in the form,
i) A= a 2
4
3 , a = length of a side of equilateral triangle.
ii) A=

4
c

$4a^2 - c^2$, where a = length of equal sides, c = third side.

iii) A= $\sqrt{s(s-a)(s-b)(s-c)}$, where a, b, c = length of the sides of a triangle and 2s is the perimeter of the triangle.

1.2 Use formula in 1.1 to solve problems.

2 Apply the concept of finding areas of quadrilateral & Parallelogram & finding areas of rhombus & trapezium.

2.1 Define quadrilateral & Parallelogram.

2.2 Find the areas of quadrilateral when off sets are given.

2.3 Find the areas of a parallelogram.

2.4 Solve problems using above formulae.

2.5 Define rhombus & trapezium.

2.6 Find the areas of rhombus when the diagonals are given.

2.7 Find the areas of trapezium in terms of its parallel sides and the perpendicular distance between them.

2.8 Solve problems related to rhombus & trapezium.

3 Apply the concept of finding areas of regular polygon.

3.1 Define a regular polygon.

3.2 Find the area of a regular polygon of n sides, when

i) The length of one side and the radius of inscribed circle are given.

ii) The length of one side and the radius of circumscribed circle are given.

3.3 Find the area of a regular.

a) Hexagon

b) Octagon when length of side is given.

3.4 Solve problems of the followings types:

A hexagonal polygon 6 m length of each side has a 20 cm width road surrounded the polygon. Find the area of the road.

4 Understand areas of circle, sector and segment.

4.1 Define circle, circumference, sector and segment.

4.2 Find the circumference and area of a circle when its radius is given.

4.3 Find the area of sector and segment of a circle.

4.4 Solve problems related to the above formulae.

5 Apply the concept of volume of a rectangular solid.
5.1 Define rectangular solid and a cube.
5.2 Find geometrically the volume of a rectangular solid when its length, breadth and height are
given.
5.3 Find the volume and diagonal of a cube when side is given.
5.4 Solve problems with the help of 6.2 & 6.3.

6 Apply the concept of surface area, volume of a prism, parallelepiped and cylinder.
6.1 Define a prism, parallelepiped and a cylinder.
6.2 Explain the formulae for areas of curved surfaces of prism, parallelepiped and cylinder.
6.3 Explain the formulae for volume of prism, parallelepiped and cylinder when base and height
are given.
6.4 Solve problems related to 7.2, 7.3.

7 Apply the concept of the surface area, volume of pyramid, cone and sphere.
7.1 Define pyramid, cone and sphere.
7.2 Explain the formula for areas of curved surfaces of pyramid, cone and sphere.
7.3 Explain the formula for volumes of pyramid, cone and sphere.
7.4 Solve problems related to 8.2, 8.3.

CO-ORDINATE GEOMETRY
8 Apply the concept of co-ordinates to find lengths and areas.
8.1 Explain the co-ordinates of a point.
8.2 State different types of co-ordinates of a point.
8.3 Find the distance between two points (x1, y1) and (x2, y2).
8.4 Find the co-ordinates of a point which divides the straight line joining two points in certain
ratio.
8.5 Find the area of a triangle whose vertices are given.
8.6 Solve problems related to co-ordinates of points and distance formula.

9 Apply the concept of locus & the equation of straight lines in calculating various Parameter.

9.1 Define locus of a point.

9.2 Find the locus of a point.

9.3 Solve problems for finding locus of a point under certain conditions.

9.4 Describe the Equation x=a and y=b and slope of a straight line.

9.5 Find the slope of a straight line passing through two point (x1, y1,) and (x2, y2).

9.6 Find the equation of straight lines:

(i) Point slope form.

(ii) Slope Intercept form.

(iii) Two points form.

(iv) Intercept form.

(v) Perpendicular form.

9.7 Find the point of intersection of two given straight lines.

9.8 Find the angle between two given straight lines.

9.9 Find the condition of parallelism and perpendicularity of two given straight lines.

9.10 Find the distances of a point from a line.

10 Apply the equations of circle, tangent and normal in solving problems.

10.1 Define circle, center and radius.

10.2 Find the equation of a circle in the form:

(i) $x^2 + y^2 = a^2$

(ii) $(x - h)^2 + (y - k)^2 = a^2$

(iii) $x^2 + y^2 + 2gx + 2fy + c = 0$

10.3 Find the equation of a circle described on the line joining (x1, y1) and (x2, y2).

10.4 Define tangent and normal.

10.5 Find the condition that a straight line may touch a circle.

10.6 Find the equations of tangent and normal to a circle at any point.

10.7 Solve the problems related to equations of circle, tangent and normal.

11 Understand conic or conic sections.

11.1 Define conic, focus, Directorx and Eccentricity.

11.2 Find the equations of parabola, ellipse and hyperbola.

11.3 Solve problems related to parabola, ellipse and hyperbola.

VECTOR :
12 Apply the theorems of vector algebra.
12.1 Define scalar and vector.
12.2 Explain null vector, free vector, like vector, equal vector, collinear vector, unit vector,
position vector, addition and subtraction of vectors, linear combination, direction cosines
and direction ratios, dependent and independent vectors, scalar fields and vector field.
12.3 Prove the laws of vector algebra.
12.4 Resolve a vector in space along three mutually perpendicular directions
12.5 Solve problems involving addition and subtraction of vectors.

13 Apply the concept of dot product and cross product of vectors.
13.1 Define dot product and cross product of vectors.
13.2 Interpret dot product and cross product of vector geometrically.
13.3 Deduce the condition of parallelism and perpendicularity of two vectors.
13.4 Prove the distributive law of dot product and cross product of vector.
13.5 Explain the scalar triple product and vector triple product.
13.6 Solve problems involving dot product and cross product.

65922 PHYSICS-2

T P C
3 3 4

OBJECTIVES
• To develop 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 and Heat Capacity; Expansion of materials (effect of heat); Heat transfer; Humidity;
Nature of heat and Thermodynamics; Photometry; Reflection of light; Refraction of light; Electron ,
photon and Radio activity; Theory of Relativity.

DETAIL DESCRIPTION

THEORY

1. THERMOMETRY AND HEAT CAPACITY

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 range of the Celsius scale determined by the boiling point and melting point of
water

1.5 State the construction and graduation of a mercury thermometer.

1.6 Define specific heat capacity, thermal capacity and water equivalent with their units.

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

1.8 Explain the principle of calorimetry.

1.9 Define various kinds of specific latent heat.

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

1.11 Determine the specific heat of a solid by calorimeter.

2. EFFECT OF HEAT ON DIMENSION OF MATERIALS

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

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

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

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

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

2.6 Relation between the co-efficient of linear, superficial and cubical expansion of solids.

2.7 Define real and apparent expansion of liquid.

2.8 Relation between the real and apparent expansion of liquid.

3. HEAT TRANSFER

3.1 Identify the phenomena of heat transferring from hot bodies to cold bodies.

3.2 Explain the methods of heat transfer by conduction, convection and radiation with examples

of each type of transfer.

3.3 Define thermal conductivity (K) and Co-efficient of thermal conductivity.

3.4 Find the unit and dimension of Co-efficient of thermal conductivity.

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

3.6 Show that the quantity of heat flowing through a material can be found from

Q =

KA (θH − θC)t

d

3.7 State Stefan-Boltzman Law and wien's law.

3.8 State Newton's law of cooling.

3.9 Explain Green house effect.

4. HUMIDITY

4.1 Define Standard Temperature and Pressure.

4.2 Define Humidity, Absolute Humidity, Relative Humidity and Dewpoint.

4.3 Relation between vapour pressure and air pressure.

4.4 Determine Humidity by wet and dry bulb hygrometer.

4.5 Explain few phenomena related to hygrometry.

5. NATURE OF HEAT AND THERMODYNAMICS

5.1 Describe the caloric theory and kinetic theory of heat.

5.2 Explain the mechanical equivalent of heat.

5.3 State and Explain the first law of thermodynamics .

5.4 Explain Isothermal and adiabatic change.
5.5 Explain Specific heat of a gas, Molar specific heat or molar heat capacity.
5.6 Relate between pressure and volume of a gas in adiabatic Change i,
e;PV^γ=const.
5.7 State and Explain Reversible process and irreversible process.
5.8 State & explain 2nd law of thermodynamics
5.9 Entropy: Definition, unit and significant.
5.10 Explain Change of entropy in a reversible and irreversible process.
5.11 Give an example of increase of entropy in irreversible process.

6. PHOTOMETRY
6.1 Define light, medium (transparent, translucent, opaque), luminous & non-luminous bodies,
parallel, convergent & divergent of rays.
6.2 Show the travel of light in straight line.
6.3 Define photometry, luminous intensity, luminous flux, brightness and illuminating power.
6.4 Mention relation between luminous intensity & illuminating power.
6.5 Explain inverse square law of light.
6.6 Describe the practical uses of light waves in engineering.

7. REFLECTION OF LIGHT
7.1 Define mirror (plane & spherical), image (real & virtual) and magnification of images.
7.2 Describe the reflection of light.
7.3 State the laws of reflection of light.
7.4 Express the verification of laws of reflection.
7.5 Define pole, principal axis, center of curvature, radius of curvature, principal focus in case
of concave & convex mirrors.
7.6 Find the relation between focal length & radius of curvature of a concave & convex mirror.
7.7 Express the general equation of concave and convex mirror.

8. REFRACTION OF LIGHT
8.1 Define refraction of light Give examples of refraction of light
8.2 State the laws of refraction and Express the verification of laws of refraction

8.3 Define absolute and relative refractive index and Relate absolute and relative refractive index

8.4 Explain the meaning of total internal reflection and critical angle and Relate total internal

reflection and critical angle.

8.5 Give examples of total internal reflection.

8.6 Describe refraction of light through a prism.

8.7 Express the deduction of the relation between refractive index, minimum deviation and

angle of the prism.

8.8 Define lens and mention the kinds of lens.

8.9 Identify and List uses of lens.

8.10 Express the deduction of the general equation of lens (Concave & convex).

9. ELECTRON, PHOTON AND RADIO-ACTIVITY

9.1 Describe Electrical conductivity of gases.

9.2 Describe Discharge tube.

9.3 Cathode ray : Definition and its properties

9.4 X-ray : Definition, properties & uses

9.5 Discuss Photo electric effect .

9.6 Derive Einstein's photo electric equation

9.7 Define and explain radio-activity.

9.8 Describe radio-active decay law.

9.9 Define half-life and mean-life of radio-active atoms.

9.10 Define nuclear fission and fusion.

10. THEORY OF RELATIVITY

10.1 Define Space, time and Mass.

10.2 Define rest mass.

10.3 Express the theory of relativity.

10.4 Explain special theory of relativity and its fundamental postulate.

10.5 Mention different Kinds of theory of relativity.

10.6 The Relativity of Length - Length contraction.

10.7 The Relativity of Time – Time dilation.

10.8 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.

65722 COMMUNICATIVE ENGLISH

T P C
1 3 2

Introduction
This Course Will Provide A Unique Foundation In The Basic Level For Developing Listening, Speaking,
Reading And Writing Skills Into Some Of More Specialized And Advanced Capabilities Of Basic Operation
In Communication.

Theory Part
Total Mark: : 50
Continuous Assessment : 20
Final Exam : 30

Objectives:
After The Completion of the Module, Learners Will Be Able To Develop-
Creative Writing Ability
Transferring Information, Ideas And Knowledge
#Communicative Competence Effectively In The Workplace Situation.

1.Comprehension For Reading Task (Mark:10)

(Text May Be Taken From Contemporary Journals, Editorial of News Papers Or From Online Resources)

Test Items:

1. MCQ (Guessing Meaning from Context)

2. Rearranging

3. Gap-Filling (With Clues or Without Clues)

4. Answering Questions

5. Summarizing

2. Composition (Mark: 20)

The Following Are The Topic Title Introduced For Writing Task:

1. Introduce Formal/Informal Greeting &Farewell

2. Describe The Idea Of Communication & Presentation Skills

3. Write Paragraph On The Basis Of Comparison and Contrast

4. Narrate Process, Stories And Interpreted Charts, Graphs.

5. Write Letters to the Print and Electronic Media

6. Write Letters of Advice, Complaints, Inquiry, Order and Cancellation

6. Prepare Seven Days Weather Report.

7. Make An Attractive Poster For The People Giving Advice To Protect The Environment.

8. Prepare A Series Of Questions About Personal Information, Place Of Interest, Foods, Hobby And

Employment Opportunity.

9. Write Dialogue On The Following Situations

About Exchanging Views With A Person And Introducing One Narrating Daily Activities

Meeting At The Train Station & Asking Question About The Departure And Arrival Of The Train

To The Station Manager

Meeting at The Airport And Asking The Flight Schedule

Getting To The Hotel And Asking For A Reservation

Social Language for Telephonic Conversation

Talking About the Weather, Trips & Sight Seeing

Asking Permission and Making Request.

Talking About Office and Office Manner

Talking About Etiquette and Manner

10. Prepare Job Application With A Complete CV For Job Suitable For You.

Practical Part:
Objectives:
1. Communicate The Areas That Learners Encounter In Real Life Situation.
2. Reinforce The Basic Language Skills Of Listening And Speaking.
3. Integrate ICT As Tools In Learning Language.

SOCIAL SCIENCE

T P C
3 0 3

OBJECTIVE
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.
• our motherland and its historical background
• good citizenship through practicing our socio- economic culture
• liberation war and its background
• nationalism and life style of the nation

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, Consumption, income wages,

salary, value in use and savings; Production – meaning, nature, factors and laws; Demand and Supply; market
equilibrium, national income, 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 civics and social science.
1.2 Explain the importance of civics in the personal and social life of an individual.
1.3 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, socialization, Nation, Nationality, citizen and
citizenship).
2.2 State the relationship among the individuals in the society.
2.3 Discuss the methods of acquiring citizenship and state the causes of losing citizenship
2.4 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 Define the Constitution.

4.2 Explain the deferent form of Constitution

4.3 Explain state the salient feature of Bangladesh constitution.

4.4 Define the fundamental rights of Bangladesh constitution.

4.5 Meaning of human rights.

5. Understand the role of UNO in maintaining world peace

5.1 Explain the major functions of UNO.

5.2 State the composition and functions of General Assembly.

5.3 Describe the Composition and functions of Security Council.

6.4 Discuss the role of Bangladesh in the UNO.

6. Understand the role of Ethics values and good governance

6.1 Define the values, ethics and good governance.

6.2 Discuss the role of government to establish good governance

Part-2 (Economics)

1. Understand the fundamental concepts of economics.

1.1 Define the Microeconomics and Macroeconomics.

1.2 Discuss the definition of Economics as given by eminent economists.

1.3 Describe the importance of economics for Technical Student.

1.4 Define commodity, utility, value, wealth, consumption, income, savings, wages,

value in use, value in exchange and salary.

1.5 Differentiate between value in use and value in exchange.

1.6 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 production function.

2.4 Discuss the law of diminishing returns.

2.5 State the application and limitations of the law of diminishing returns.

2.6 Describe the law of production (increasing constant and diminishing).

3. Understand the concept of demand, supply and utility.
3.1 Define the term, "demand and supply".
3.2 Explain the law of demand and supply .
3.3 Draw the demand and supply curve.
3.4 Discuss Market equilibrium.
3.5 Define the utility, total and marginal utility
3.6 Illustrate the law of diminishing utility.
3.7 Explain the law of diminishing marginal utility

4. Understand national income.
4.1 Define nation income.
4.2 Explain how to measure national income.
4.3 Discuss GNP, GDP and NNP.
4.4 Discuss economic development and growth

5. Understand the current issues and the availability and use of natural resource in the economic
development of Bangladesh
5.1 Define rural and urban economics.
5.2 Identify major problems of rural and urban economy.
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 potential uses for
sustainable development.

6. 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 ofBangladesh.
6.4 Explain socio-economic status of a diploma Engineer.

Part-3 ((Bangladesh: History& Culture)

সংক্ষিপ্ত বিবরণী

ইতিহাস
ঙ ইতিহাসের সংজ্ঞা।
ঙ বাংলাদেশের আবহাওয়া ও অধিবাসী।
ঙ বাংলায় ইংরেজ শাসন ক্ষমতালাভ ও প্রতিষ্ঠা।
ঙ ব্রিটিশ বিরোধী সশস্ত্র প্রতিরোধ আন্দোলন, সংস্কার আন্দোলন ও জাতীয়তাবাদেও বিকাশ এবং বাংলার নবজাগরণ, বঙ্গভঙ্গ ও বঙ্গভঙ্গ উত্তরকালে বাংলার
রাজনীতি ও দেশ বিভাগ।
ঙ পাকিস্তান আমলে বাংলাদেশ, বঙ্গবন্ধুর নেতৃত্বে বাংলাদেশের মুক্তি সংগ্রাম ও স্বাধীনতালাভ।

সংস্কৃতি
সংস্কৃতি, সভ্যতার সংজ্ঞা, সংস্কৃতির প্রকরণ, ভাষা আন্দোলন উত্তর বাংলার সংস্কৃতি, স্বাধীনতা উত্তর বাংলাদেশের সংস্কৃতির বিবর্তন, বাংলাদেশের সংস্কৃতিতে
প্রত্নবতাত্ত্বিক নিদর্শন ও ক্ষুদ্র নৃতাত্ত্বিক গোষ্ঠীসমূহ।