Course **B.E Marine Engineering**

Semester I

Subject Code UBEEC01

Subject Name BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

PART - A

UNIT - I

1 What are the importance of electrical engineering in our day to day life?

2 State ohms law.

3 Mention the disadvantages of Ohm s Law.

4 Define KCL Law.

5 Define KVL Law.

6 What is meant by active and passive elements?

7 What is meant by unilateral and bilateral elements?

8 Define an ideal current source.

9 Define an ideal voltage source.

10 State voltage division rule.

11 State current division rule.

12 State Ohm's law and list its limitations.

13 What is a node?

14 What is a junction?

15 What is a branch?

16 Name some energy storing elements electrical Engineering.

17 Convert a voltage source of 20V with a series resistance of 5Ω to a current source.

18 Write the formulae for series and parallel connection of two resistances.

19 If $R1=27\Omega$ and $R2=15\Omega$ are connected in series then find the equivalent resistance of the circuit?

20 Two 50 Ω resistors are connected in series. When a resistor R is connected across one of them, the total equivalent resistance is 60 Ω . Calculate the value of R.

UNIT - II

1 Sate superposition theorem.

2 State Thevenins theorem.

3 State Norton's theorem.

4 State maximum power transfer theorem.

5 What are the steps to solve the super position theorem.

6 What is the limitation of superposition theorem?

7 What are the steps to solve the Thevenin s Theorem.

8 Define source transformation.

9 What is the purpose of star delta transformation?

10 Define RMS value of an A.C Quantity.

11 Define Average Value of an A.C Quantity.

12 Define peak factor.

13 Define power factor.

14 Define form Factor.

15 Define Time period and Frequency of an A.C Quantity.

16 Draw the phasor diagram for pure resistor in an ac circuit.

17 Draw the phasor diagram for pure inductor in an ac circuit.

18 Draw the phasor diagram for pure capacitor in an ac circuit.

19 Draw the phasor diagram for RL series in an ac circuit.

20 Draw the phasor diagram for RC series in an ac circuit.

UNIT - III

1 What is meant by phase sequence?

2 Define line current and phase current.

3 Define line and phase voltage.

4 Give the line and phase values in star connection.

5 Give the line and phase values in Delta connection.

6 Write expression power factor in three phase balanced circuit.

7 What is meant by balanced circuit?

8 What is meant by unbalanced circuit?

9 Name the methods of connection in three phase circuits.

10 What is meant by delta connection?

11 What is meant by Star connection?

12 Write the expression for real power in 3 phase system.

13 Write the expression for reactive power in 3 phase system.

14 Write the expression for apparent power in 3 phase system.

15 Write the expression for complex power in 3 phase system.

16 Write few methods available for measuring in 3-phase load.

17 What is the relationship between line voltage and phase voltage in Star mode?

18 What is the relationship between line current and phase current in Delta mode?

19 What is the difference between neutral and ground?

20 What is meant by 3 phase 4 wire system?

UNIT - IV

1 What is meant by intrinsic material?

2 What is meant by extrinsic material?

3 Define biasing.

4 What is meant forward biasing?

5 What is meant reverse biasing?

6 State about meant zero biasing.

7 What is meant by doping?

8 What is meant by P-Type material?

9 What is meant by N-Type Material?

10 What is meant by Zener Break down?

11 What is meant by Avalanche Break down?

12 What is meant by short circuit?

13 What is meant by open circuit?

14 Why silicon materials are preferred in manufacturing electronic devices?

15 Define cut off voltage.

16 Name some pentavalent elements.

17 Name some trivalent elements.

UNIT - V

1 Based on broad sense, how instruments can be classified.

2 What do you understand by absolute instruments?

3 Name some secondary instruments used in engineering.

4 State the operation of recording type instrument.

5 Brief about the integrating type instrument.

6 What do understand by indicating type instrument?

7 Name the quantities which produce deflecting torque.

8 What is meant restoring torque?

9 What is meant by controlling torque?

10 What is meant damping torque?

11 State the importance of restoring torque.

12 List the classification of Moving-iron instrument.

13 List the classification of Moving-coil instrument.

14 Name the sources of error in the instrument.

15 How the ammeter range can extend?

16 How the volt meter range can extend?

17 Justify the reasons for extension of meters.

18 Name the two magnets available on the watt meter.

19 Which instrument is used for testing the insulation resistance in engineering?

20 What do you understand by creeping?

PART - B

UNIT - I

1 A metallic wire is 500 m long and has a diameter of 1mm. Determine the resistance of the wire, if it is of a) copper of $\overset{\circ}{}_{\circ}$

resistivity $1.732 \times 10^{-8} \Omega m$ and b) aluminium of resistivity $2.83 \times 10^{-8} \Omega m$.

 $2\,$ Write the comparison between series and parallel circuits.

3 Derive the expression for combined resistance in series circuit.

4 Derive the expression for combined resistance in parallel circuit.

5 State the loop current method with example.

6 State the Node voltage method with example.

7 Write the STAR to DELTA conversion equation and state the application of it.

8 Write the DELTA to STAR conversion equation and state the application of it.

9 Apply Kirchhoffs law to find I_1 , I_2 and current in 20 Ω resistor.



10 Calculate the equivalent resistance and current in the network shown below.



11 Calculate the equivalent resistance of the following combination of resistors and also find the source current.



- 12 A filament lamp is rated for 110v,60watts. Find the series resistance necessary to operate this lamp on a 230 volt, main supply. What is the power lost in this resistance.
- 13 a) Transform a voltage source of 20V with a series resistance of 5Ω to a current source.b) Convert a current source of 10A in parallel to a 5Ω resistor to a voltage source.
- 14 Determine the equivalent resistance of the circuit between A and B.



15 Two resistances $R_1=1.95 \Omega$ and $R_2=0.05\Omega$ are connected in parallel, take a total current of 50A. Obtain expressions for the currents in the individual resistances.

UNIT - II

1 State Thevenin's theorem. Determine the current in the network shown using Thevenin's theorem.



2 Find the load current using Thevenin's theorem.



- 3 Define the following A.C Quantities a)RMS Value b)Average value c) Peak value d) Form Factor
- 4 Define the following A.C Quantities a) Amplitude b) Peak Factor c) Power Factor d) Form Factor
- 5 Derive the expression for total impedance for R-L series circuits.
- 6 Derive the expression for total impedance for R-C series circuits.
- 7 Derive the expression for total impedance for R-L-C series circuits.
- 8 Derive the expression real power and reactive power R-L series circuits.
- 9 Derive the expression real power and reactive power R-C series circuits.
- 10 Derive the expression for Real power and reactive power for R-L-C series circuits.
- 11 State Superposition theorem. Find the value of load resistance in the given circuit for transfer of maximum power. Determine the maximum power.



12 Obtain the Norton's equivalent circuit at the terminals A and B for the given network.



13 Analyze the behaviour of series resistor and inductor in an AC circuit.

14 Analyze the behaviour of series R-L-C in an AC circuit.

15 A pure inductance of 318mH connected in series with a pure resistance of 75 Ω . The circuit is supplied from a 50 Hz source and the voltage across the 75 Ω resistor is found to be 150V. Calculate the supply voltage and the phase angle.

UNIT - III

1 What are the advantages of three phases over single phase system?

2 Draw star connection and label the following a) line voltage) phase voltage c) line current d) phase current

3 Draw Delta connection and label the following a) line voltage) phase voltage c) line current d) phase current

4 Tabulate the difference between Star and delta electrical quantities.

5 How a 3 phase load power can be made available with two watt meter?

6 What is the difference between Two watt meter with Three watt meter method in 3 phase power measurement?

7 How the unbalanced current is measured in 3 phase system?

8 Explain with a simple sketch about unbalancing in 3 phase system.

9 What is meant by balancing in 3 phase system with a simple sketch explain?

10 Compare star mode with delta mode in three phase power system.

11 Draw a star phasor diagram labels all electrical quantities.

12 Draw a delta phasor diagram label all important electrical quantities.

13 What is meant by sequencing in 3 phase circuits?

14 What is meant neutral earthing in three power system?

15 Compare single with three phase power system.

UNIT - IV

1 Explain the forward biasing of PN junction diode with simple sketch.

2 Describe the reverse biasing of PN Junction diode with neat sketch.

3 Write short note on doping process.

4 What is meant by threshold voltage in zener diode?

5 Explain about zener effect in P-N junction?

6 Explain about avalanche effect P-N junction.

7 With suitable sketch explain the biasing in electronics.

8 Draw explain about CB configuration NPN transistor.

9 Draw explain about CE configuration NPN transistor.

10 Draw explain about CC configuration NPN transistor.

11 Draw explain about CB configuration PNP transistor.

12 Draw explain about CE configuration PNP transistor.

13 Draw explain about CC configuration PNP transistor.

14 Compare zener break down vs Avalanche break down.

15 How to test the Diode with Multimeter?

UNIT - V

1 State the reasons for creeping and how it can be solved.

2 State the Advantage and Disadvantages PMMC meter.

3 Write the Dynamometer Type Instruments Advantages and Disadvantages.

4 With a suitable sketch explain Extension of Range by Multipliers.

5 With a suitable sketch explain Extension of Range by Shunts.

6 Briefly explain about the Sources of Error in instrumentation.

7 Explain with a simple sketch the Deflecting Torque in instrumentation engineering.

8 Explain with a simple sketch the controlling Torque in instrumentation engineering.

9 Explain with a simple sketch the damping Torque.

10 State the disadvantages of gravity control torque.

11 State the properties of control spring employed for torque control.

12 State the different Electrical Principles of Operation of instruments.

13 Name the three different torques pertaining to instrumentation and explain any one of it.

PART - C

UNIT - I

1 Calculate the current through 6Ω resistor using loop analysis.



2 Find the current through each resistor of the circuit shown using nodal analysis.



3 Using loop current technique solve the problem for the unknown for the given diagram?



4 Using Node voltage techniques solve the problem for the unknown for the given diagram?



- 5 a)Derive the star to delta conversion
- b) Transform the values from star to delta using a) expression.



6 a) Derive the Delta to Star conversionb) Transform the values from delta to star.



- 1 A coil of resistance 5Ω and inductance 120mH in series with a 100μ F capacitor is connected to a 300V, 50 Hz supply. Calculate (a) the current flowing in the circuit (b) the phase difference the supply voltage and current flowing (c) the voltage across the coil (d) the voltage across the capacitor (e) sketch the phasor diagram
- 2 A circuit having a resistance 12Ω, an inductance of 0.15H and a capacitance of 100µF in series, is connected across 100v, 50Hz supply. Calculate (a) the impedance (b) the current (c) voltage across R, L and C (d) phase difference between supply voltage and current (e) phasor diagram.
- 3 A Resistance of 60 Ohm, an Inductance of 0.18H and a capacitance of 120micro-Farad are connected in parallel across a 100V, 50Hz supply. Determine the following a) Current in each path b) Resultant current c) Angle between resultant current and supply voltage d) Power factor of the circuit
- 4 Two impedances $(15-j10)\Omega$ and $(10+j15)\Omega$ are connected in parallel. The supply voltage is 200V, 50Hz. Calculate i) the admittance, ii) conductance, iii) susceptance of the combined circuit, iv) total current & v) total power factor



5 Determine the R.M.S Value of the current in each branch and total current of the circuit shown and also draw the phasor diagram



6 Explain the A.C Network Thevinin's and Norton's Theorem.

UNIT - III

- 1 Derive the expression between a) line voltage and phase voltage b) line current and phase current in STAR connection along with phasor diagram.
- 2 Derive the expression between a) line voltage and phase voltage b) line current and phase current in DELTA connection along with phasor diagram.
- 3 Explain the three phase power measurement by two watt meter method.
- 4 Explain the three phase power measurement method used for both balanced and unbalanced loads.
- 5 Three equal impedances each having a resistance of 250hm and reactance of 40 ohm connected in star mode to a three phase 400 V,50 Hz system ,calculate the following a)line current b) power factor c)power consumed .
- 6 Three equal impedances each having a resistance of 250hm and reactance of 40 ohm connected in delta mode to a three phase 400 V,50 Hz system ,calculate the following a)line current b) power factor c)power consumed.

UNIT - IV

1 Explain the V-I Characteristics of P-N junction diode.

2 With a neat diagram explain the half wave rectifier with input and output wave form.

- 3 With a neat diagram explain the Full wave rectifier centre tapping type with input and output wave form.
- 4 With a neat diagram explain the Full wave rectifier bridge configuration type with input and output wave form.
- 5 Explain the Characteristics of P-Channel JFET with neat diagram.

6 Explain the Characteristics of N-Channel JFET with neat diagram.

UNIT - V

1 Explain the operation of Induction Type Single-phase Watt-hour Meter.

2 Explain the operation of Induction Wattmeter's with suitable sketch.
3 With a neat sketch explain Dynamometer type Wattmeter.
4 With a neat sketch explain the operating principle of Induction Ammeters.
5 With a neat sketch explain working principle of Megger.
6 Explain in detail about the construction and operation of moving coil instruments.