

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

First/Second Semester B.E./B.Tech. Degree Examination

Subject: Introduction to Electrical Engineering

Subject Code: 1BESC104B/204B

Time: 3 Hours

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module - 1

1.

- a) State KCL and KVL. Explain the sign convention with an example. 6 M
b) Use Mesh Analysis to find current in the 10Ω resistor for the given network (Assume standard bridge). 7 M
c) Derive the expressions for Star to Delta transformation. 7 M

OR

2.

- a) State Ohm's Law. What are its limitations? 6 M
b) Determine the voltage V₁ and V₂ using Nodal Analysis. 7 M
c) Two resistors are connected in parallel and this combination is in series with a 5Ω resistor. If total voltage is 50V, find power dissipated. 7 M

Module - 2

3.

- a) Derive the expression for RMS and Average value of a sinusoidal wave. 6 M
b) A series RLC circuit has R=10Ω, L=0.1H, C=50μF. Supply is 200V, 50Hz. Find Current and Power Factor. 7 M
c) Draw and explain the Power Triangle. Define Active, Reactive, and Apparent power. 7 M

OR

4.

- a) Explain the behavior of AC through a pure Inductor with waveforms and phasor diagram. 6 M
b) Two circuits with impedances $Z_1=(8+j6)$ and $Z_2=(10-j5)$ are in parallel. Find total current. 7 M
c) What is resonance? Derive the expression for resonant frequency in a series RLC circuit. 7 M

Module - 3

5.

- a) In a 3-Phase Star connection, prove that Line Voltage = $\sqrt{3} * \text{Phase Voltage}$. 7 M

- b) With a circuit diagram and phasor diagram, explain the Two Wattmeter method. 7 M
c) A balanced delta connected load draws 10A line current at 0.8 pf lag. Calculate total power. 6 M

OR

6.

- a) In a 3-Phase Delta connection, prove that Line Current = $\sqrt{3} * \text{Phase Current}$. 7 M
b) Explain Plate Earthing with a neat diagram. 7 M
c) Explain the effect of Load Power Factor on Wattmeter readings (Unity, 0.5, Zero). 6 M

Module - 4

7.

- a) Draw a neat diagram of a DC Machine and label the parts. Explain the function of the Commutator. 7 M
b) Derive the EMF equation of a transformer. 6 M
c) A 4-pole DC motor takes 20A at 200V. Resistance is 0.5Ω . Find Back EMF. 7 M

OR

8.

- a) Explain the Open Circuit (OC) and Short Circuit (SC) tests on a transformer. 7 M
b) Derive the Torque equation of a DC Motor. 6 M
c) A 10kVA transformer with turn ratio 500/1000 is connected to 200V supply. Find secondary voltage and full load currents. 7 M

Module - 5

9.

- a) Explain the construction and working of a 3-Phase Induction Motor. 7 M
b) Derive the EMF equation of an Alternator (Synchronous Generator). 7 M
c) A 3-phase induction motor has 4 poles and runs on 50Hz. Calculate synchronous speed. 6 M

OR

10.

- a) Explain the concept of Slip in Induction Motors. Why can slip never be zero? 6 M
b) Explain the working of a Dynamo/DC Generator briefly. 7 M
c) Write a note on domestic wiring safety: Use of Fuse vs MCB. 7 M