BT-2/M-23   42041
BASIC ELECTRICAL ENGINEERING
ES-101A

Time : Three Hours]   [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. Find Norton's equivalent of circuit shown as Fig. 1 (below), w.r.t. load resistor of 32Ω.   15
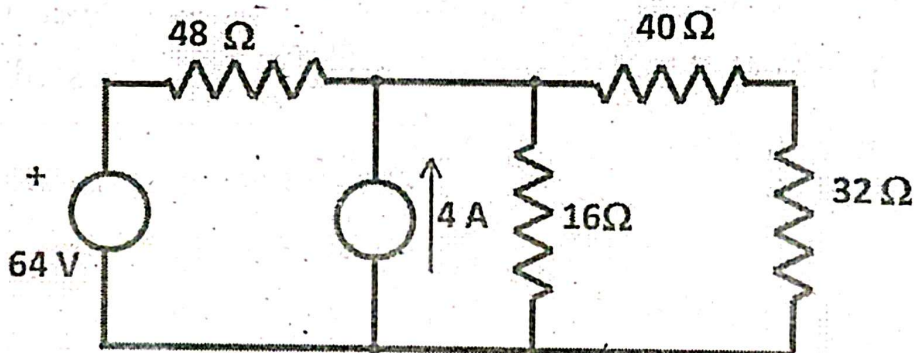

Fig. 1

2. Find Thevenin's equivalent of circuit shown as Fig. 1 (above), w.r.t. load resistor of 16Ω.   15

Unit II

3. (a) Explain in detail the theory of sinusoidal frequency response of series RLC ckt. including resonance.

   10

   (b) The voltage applied to an ac circuit is $500\sqrt{2}\cos(100\pi t)$ V and the ckt. draws current of $100\sqrt{2}\sin(100\pi t - 5\pi/6)$ A. Taking voltage as the reference phasor, find the phasor representation (polar form) of the current in amperes.

   5

4. (a) Given the AC voltages : $V_1 = 20\sin(\omega t)$ V, $V_2 = 40\cos(\omega t)$ V and $V_3 = -40\cos(\omega t + 120°)$ V, find their sum in periodic sine reference.

   7

   (b) An ac wave $v = V_m \sin \omega t$, is made half wave rectified. Find the average and r.m.s. values of the new wave for complete cycle.

   8

Unit III

5. (a) Explain in detail the two wattmeter method of power measurement for a (star or delta connected) load (any type) with suitable steps containing equations, neat ckt. and phasor diagram.

   10

(b) Taking X-axis intervals of 30 degree each, draw neatly the complete waves on simultaneous axis :
$V_1 = V_m \sin \omega t$, $V_2 = V_m \sin (\omega t - 120°)$ and $V_3 = V_m \sin (\omega t - 240°)$. **5**

6. (a) Explain in detail the OC and SC test on a single phase transformer. **12**

(b) Deduce condition of maximum efficiency of a single phase transformer. **3**

Unit IV

7. (a) Explain in detail the construction of a DC motor and working of commutator using neat sketches. **10**

(b) Derive generated EMF equation in case of a DC generator. **5**

8. (a) With neat sketches, explain and prove the statement :
'A 3 phase pulsating magnetic flux produced by 3-phase excited stator winding is equivalent to a single (bipolar) rotating flux'. Hence, explain how the rotor of squirrel cage type 3-phase induction motor starts rotating. Also explain slip. **12**

(b) Give function of an armature coil in an electrical machine. Give examples of motors/generators in which field is stationary/moving with respective armature moving/stationary. **3**