

B.TECH.
THEORY EXAMINATION (SEM-II) 2016-17
BASIC ELECTRICAL ENGINEERING

Time : 3 Hours

Max. Marks : 70

Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.

SECTION - A

1. Attempt any seven of the following:

7 x 2 = 14

- a) Write two characteristics of Active elements
- b) The two voltage waves are given: $V_A = 150\sin(\omega t + 45^\circ)$ $V_B = 75\sin(\omega t - 15^\circ)$
Which voltage wave is leading with other and what will be the phase angle between V_A and V_B .
- c) What is series resonance?
- d) State Norton's Theorem.
- e) Write four advantages of Three Phase System.
- f) Why Damping torque is provided to an indicating instrument?
- g) Define Magnetomotive Force (mmf).
- h) Write two differences between a transformer and an autotransformer.
- i) Write two applications of Synchronous motor.

SECTION - B

2. Attempt any three parts of the following questions:

3 x 7 = 21

- a) Using Nodal analysis find the current through $1\ \Omega$ resistance shown in Fig. 1.

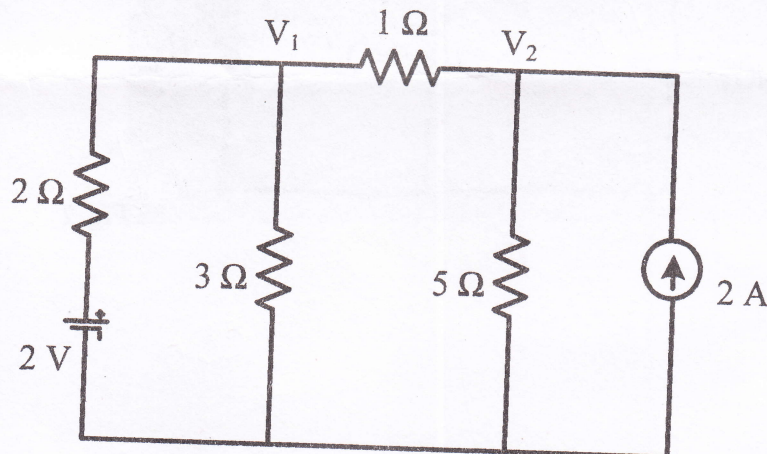


Fig.1

- b) Draw the phasor diagram for the following voltages. Calculate the resultant voltage. Also find the r.m.s. voltage.
 $v_1 = 100\sin 500t$ $v_2 = 200\sin(500t + \pi/3)$
 $v_3 = -50\cos 500t$ $v_4 = 150\sin(500t - \pi/4)$
- c) Explain the principle and construction of PMMC type instruments. Discuss their merits and demerits.
- d) Deduce analogy between electric circuits and magnetic circuits. Also explain B-H curve and discuss its effect on hysteresis loss
- e) Derive emf equation of D.C. machine. Also deduce the expression for torque of a dc machine.

SECTION - C

Attempt any five parts of the following questions:

5 x 7 = 35

3. In a 25 kVA, 2000 V/200 V transformer the iron and copper losses are 200 W and 400 W respectively. Calculate the efficiency of half load and 0.8 pf. lagging. Also determine the maximum efficiency and corresponding load.
4. Single phase induction motor is not self-starting. Explain? Name various starting methods of single phase induction motor and explain capacitor run motor.
5. Explain series resonance in RLC circuit. What are the bandwidth and quality factor of the circuit? Derive expressions for lower and upper half power frequencies for a series RLC circuit.
6. A 46 mH inductive coil has a resistance of 10 ohm. How much current will it draw, if connected across 100 V, 50 Hz source? Also determine the value of capacitance that must be connected across the coil to make the power factor of the circuit to be unity.
7. A balanced star connected load of $(8 + j6) \Omega$ per phase is connected to a 3-phase 400 V supply. Find the line current, power factor, 3-phase power and 3-phase volt-amperes. Also draw the phasor diagram.
8. Define power factor. Discuss reasons for poor power factor. How can power factor be improved?
9. A dc shunt generator delivers 50 kW at 250 V when running at 500 rpm. The armature and field resistances are 0.05Ω and 125Ω respectively. Calculate the speed of the same machine and developed torque when running as a shunt motor and taking 50 kW at 250 V.
10. State and prove maximum power transfer theorem. Find the Value of R_L that we can transfer maximum power to it & also calculate the maximum power transferred as shown in Fig.2.

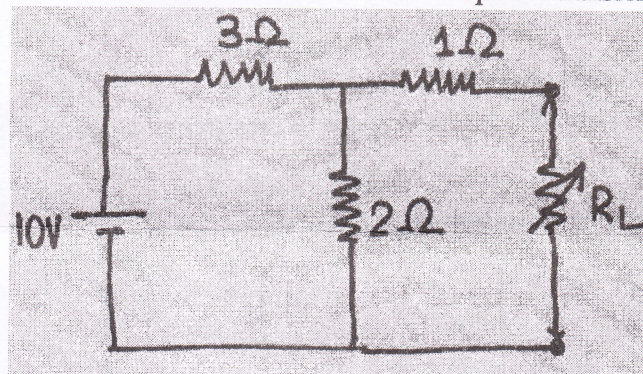


Fig. 2