AUTUMN END SEMESTER EXAMINATION-2015

1st Semester B.Tech & B.Tech Dual Degree

BASIC ELECTRICAL ENGINEERING (EE-1003)

(Regular-2015 Admitted Batch)

Full Marks: 60 **Time: 3 Hours**

Answer any SIX questions including Question No.1 which is compulsory.

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.

1. a) Draw the sketch of a single phase autotransformer. [2 × 10

   b) A current of $40\cos(314t - \pi/8)$ A is drawn from a supply voltage of $500\cos(314t + \pi/8)$ V. Calculate the power supplied from the source.

   c) In a series RC circuit, the voltage across the capacitor and resistor as obtained by a moving iron type AC voltmeter are 60 V and 80 V respectively. How much will the voltmeter read when it is connected across the combination?

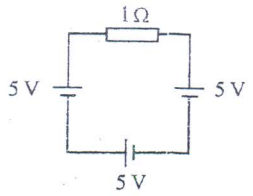
   d) A 250 kVA, 11000 V/400 V, 50 Hz single phase transformer has 80 turns on the low voltage side. Calculate the number of turns of the high voltage side.

   e) State and explain Faraday's law of electromagnetic induction.

   f) Current in a circuit with impedance Z ohm is 18 A and leads the voltage across it by 36^0. The voltage being 20 V. Draw the waveforms for the voltage and current in one plot and corresponding phasors in another plot.

   g) What is hysteresis loss and mention how it can be reduced for a transformer?

h) How much current will flow through the 1 Ω resistor in the circuit?



i) Draw a sketch of dynamometer type wattmeter and label different components.

j) Define luminous flux and luminous intensity and mention their units.

2. a) using Thevenin equivalent approach obtain the voltage across the 10 Ω resistor. [5

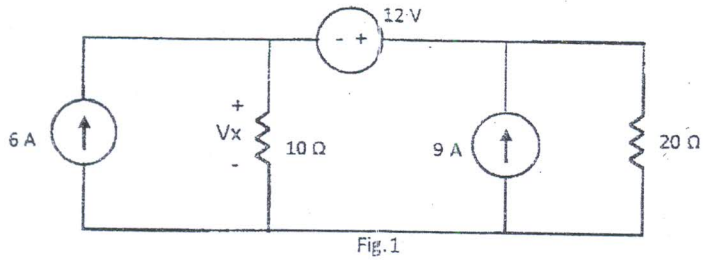
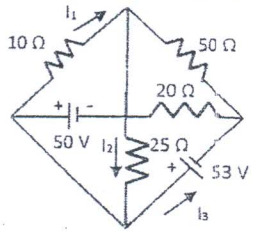


Fig. 1

b) For the circuit shown find I_1, I_2 and I_3. [3



3. a) Find the current phasor through 10 Ω resistor. [4

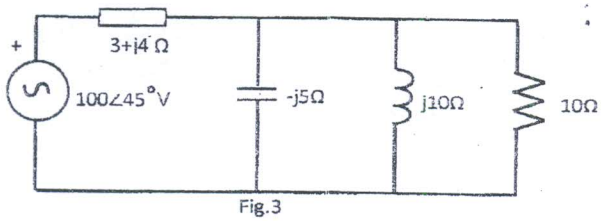
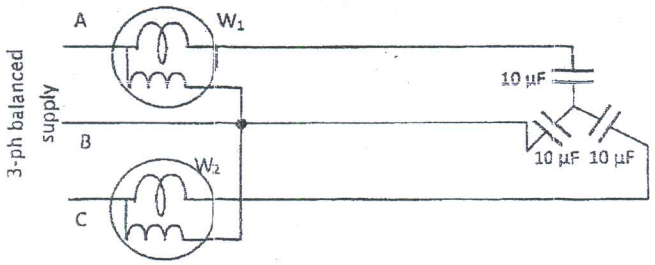


Fig. 3

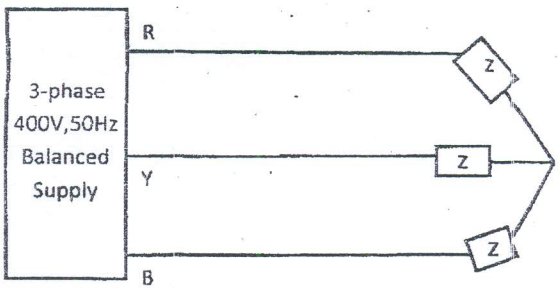
b) The voltage drops across two components when connected in series across an AC supply are: [4

$v_1 = 180\sin 314t$ and $v_2 = 120\sin(314t + \pi/3)$ volts and the current through the combination is $i = 10\sin 314t$ amperes. Calculate the RMS value of the supply voltage and the power consumed by the combination.

4. a) Find the watt meter readings W_1 and W_2 for the circuit shown. Considering phase A voltage as reference and the sequence is A-B-C. Line to line voltage is 400 V and supply frequency is 50 Hz. [5



b) For the 3-phase balanced system calculate the power consumed in each impedance (Z) and power supplied by the source. Each $Z = 10\angle 30^0\,\Omega$. [3



5. a) A single phase transformer has 400 primary and 1000 secondary turns. The next cross sectional area of the core is 60 cm^2. If the primary is connected to 500 V, 50 Hz source, calculate the peak value of flux density in the core. [4

b) Write how a rotating filed is created in a three phase induction motor. [4

6. a) An iron ring of mean circumference of 140 cm and cross section 12 cm^2 is wound with 500 turns of wire. With the exciting current of 2A, the flux is found to be 1.2 mWb. [4