3010

B. Tech. 1st Semester (Common for All Branches) Examination – December, 2022

BASIC ELECTRICAL ENGINEERING

Paper : ESC-EE-101-G

Time : Three hours]   *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, by selecting *one* question from each Section. Question No. 1 is *compulsory.*

1. (a) State and explain Faradays law of electro magmatic induction.   5 × 3 = 15

   (b) Define Average Value, if the standard value of current is i = I_m sin ωt, what will be the rms value ?

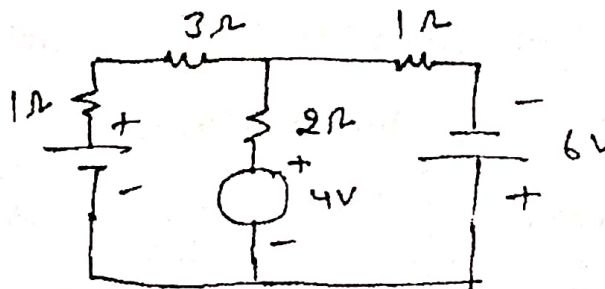   (c) Write down assumptions for an ideal transformer.

   (d) What do you mean by back EMF, give expression ?

(e) Briefly write down about attraction type MI instruments.

SECTION – A

2. (a) State and explain Norton's Theorem.   7

   (b) In the given circuit, find the current through 2 ohm resistor using Superposition Theorem.   8

3. State Thevenin's Theorem. Determine the value of current flowing through 1 ohm resistance by using Thevenin's theorem.   15
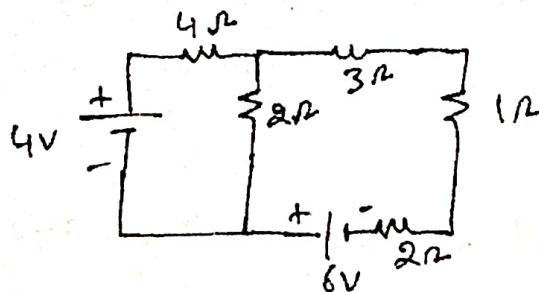

SECTION – B

4. (a) The maximum value of alternating voltage and current are 420V and 22A respectively in a circuit connected to 50Hz supply and these quantities are sinusoidal. The instantaneous values of the voltage and current are 280V and 10A respectively at t = 0 both increasing positively.   10

(i) Write down the expression for voltage and current at time *t*.

(ii) Determine the power consumed in the circuit.

(b) Define RMS value of a sinusoidal signal and hence deduce Form Factor.   5

5. (a) An alternating current of frequency 50Hz has a maximum value of 115A. Write down the equation for its instantaneous value. Reckoning time from the instant the current is zero and becomes positive; find (a) the instantaneous value after 1/360 sec and (b) the time taken to reach 96A for the first time.   8

(b) Define real power, reactive power and apparent power. Also explain the mathematical equation for all these three terms.   7

SECTION – C

6. (a) Using appropriate phasor diagram, derive the relationship among voltages and current in star connection in three phase system.   8

(b) A balanced star-connected load of (8+j6) ohms per phase is connected to a balanced 3-phase 420V supply. Find the line current, power factor and total volt-amperes.   7
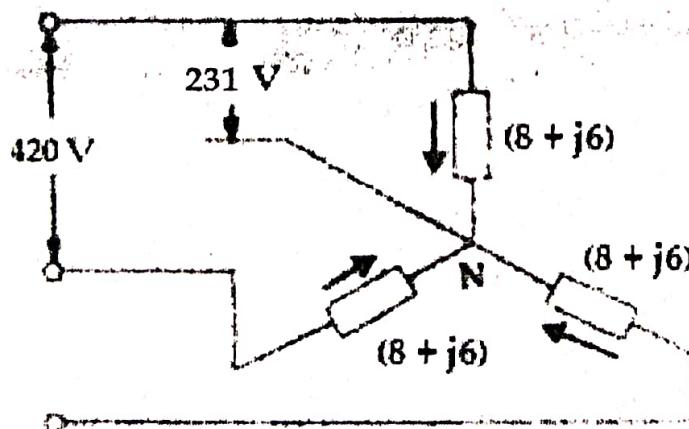
7. (a) Using the appropriate phasor diagram, derive the relationship among voltages and currents in delta connected three phase system. 8

(b) A delta connected balanced 3 phase load is supplied from a 3 phase, 420V supply. The line current is 22A and the power taken by the load is 10,500W. Find (i) impedance in each branch (ii) the line current, power factor and power consumed if the same load is connected in star. 7

SECTION – D

8. Briefly explain construction, working and principle of Induction machine with neat labelled diagrams. 15

9. A separately excited DC generator has armature circuit resistance of 0.2 ohm and the total brush drop is 1 V per brush. When running at 960 rpm, it delivers a current of 110A at 260V to a load of constant resistance. If the generator speed drop to 680 r.p.m, with field-current unaltered, find the current delivered to the load. 15

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