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FIRST SEMESTER **B.Tech. (Group-A)**

END SEMESTER EXAMINATION (November-2014)

EE-105 ELECTRICAL SCIENCES

Time: 3:00 Hours *Max. Marks: 70*

Note: Answer any Five questions. All questions carry equal marks. Assume the missing data suitably (if any)

1(a) Derive a relation for obtaining the delta connected formation of three resistances equivalent to star connected formation of three resistances. [6]

(b) A current of 20 A flows through two ammeters A and B joined in series. The potential difference between A and B is 0.2 V and 0.3 V respectively. Find how the same current will divide between A and B when they are joined in parallel. [8]

2(a) State and illustrate with the help of an example the Tellegen's Theorem for electrical networks. [6]

(b) Determine the loop current of the network as shown in Fig. 1. [8]

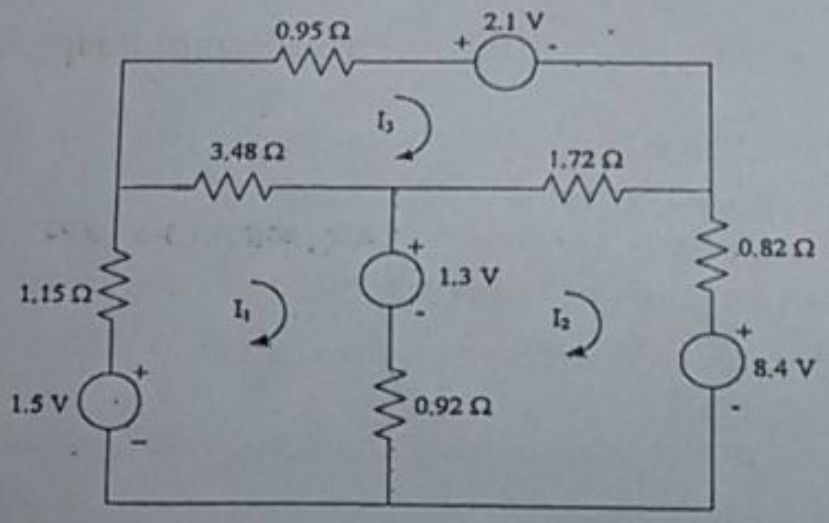

Fig. 1

3(a) Enumerate the advantages of using sinusoidal waveform for electric power supply. [6]

(b) In the circuit shown in Fig. 2. What value of voltage (V θ) applied across A-B will cause a current of 10 $\angle 0°$ A to flow in the capacitor. Assume that the frequency of voltage applied as 50 Hz. [8]

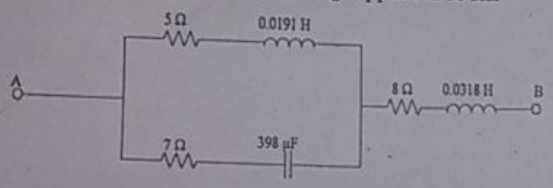

Fig. 2

4(a) Define series resonance in AC circuits. Draw the graphs showing variation of resistance, inductive reactance, capacitive reactance, total impedance and current with frequency. [6]

(b) A coil of resistance 40 Ω and inductance of 0.75 H forms part of a series circuit for which resonant frequency is 55 Hz. If the supply voltage is 250 V, 50 Hz, find the line current, power factor and voltage across the coil. . [8]

5 (a) Answer the following questions in reference to measurement of power using two single-phase wattmeter in 3 ϕ circuits. [6]

(i) How will you measure reactive power in three phase circuits?

(ii) What would be the readings of two wattmeter in this experiment if load is purely resistive?

(iii) What would be the readings of two wattmeter in this experiment if load is purely reactive?

(iv) If one of the wattmeter reads zero, what would be the power factor of the load?

(b) A balanced 3 ϕ star connected load of 150 kW takes a leading current of 100 A with line voltage of 1100 V, 50 Hz. Find the constants of load. [8]

6 (a) What are the different losses in a transformer? Explain how these losses can be minimized? [6]

(b) A 2500/250 V, 25 kVA transformer has a core loss of 130 W and full load copper loss of 320 W. Calculate the maximum efficiency this transformer can exhibit. Also, determine the load kVA under this condition; consider the power factor of the load as unity. [8]

7 Explain the construction and principle of working of any two of the following: [2x7]

(a) Permanent magnet moving coil ammeter

(b) Multimeter

(c) Digital Voltmeter

(d) AC Watt-hour meter

8. Write notes on *any two* of the following [2x7]

(a) Extension of range of voltmeter and ammeter

(b) Dependent sources

(c) Thevenin's Theorem

(d) Analogy between electric and magnetic circuits

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