U.S.N

P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Second Semester, B.E. - Make-up Examination; July -2016

Basic Electrical Engineering

(Common to all Branches)

Time: 3 hrs *Max. Marks: 100*

***Note**: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.*
ii) Missing data may suitably assume.

UNIT - I

1 a. State and explain Kirchhoff's Laws. 6

b. What are the values of R_1 and R_2 must have for Fig. 1(b) under the following conditions,
(i) When I_1 = 4 A and I_2 = 6 A both are charging
(ii) When I_1 = 2 A discharging and I_2 = 20 A charging. 6

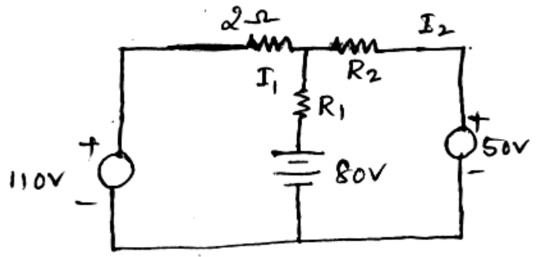

Fig 1(b)

c. Define coefficient of coupling and derive an expression for the same. 8

2 a. A portion of the network is shown in Fig. 2(a) with the polarities as indicated. The voltage across 15 Ω resistors is 30 V. Find the value of resistance R and the current I. 8

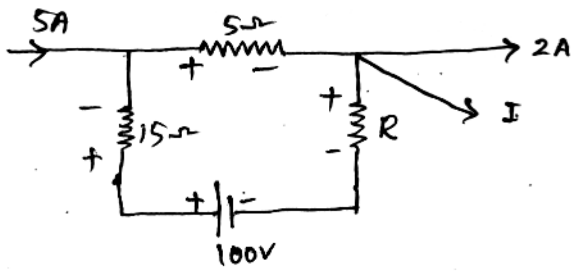

Fig 2(a)

b. State and explain Faraday's law of electromagnetic induction. 6

c. A current of 1 A is passed through a coil of 6000 turns produced a flux of 0.1 mwb. What is the inductance of the coil? What would be the voltage developed across the coil, if the coil is interrupted in 10^{-3} sec.? What is the energy stored in the coil? 6

UNIT - II

3 a. Define RMS, average, form factor and peak factor of an alternating current. 6

b. With usual notations, prove that the power consumed in series RL circuit is VI cosϕ. 6

	c.	Two parallel impedances Z_1 = (10+j15) Ω and Z_2 = (6-j8) Ω is connected in series with third impedances Z_3 = (5+j2) Ω. Determine the branch current and power consumed in each branch when the circuit takes a current of 15 A.	8
4	a.	With necessary equations and waveforms explain phase and phase difference.	6
	b.	Show that why the average power demand never becomes zero in case pure resistive element starting from basic fundamentals.	8
	c.	In a series RLC circuit, R Ω, L = 0.2 H and a capacitance of C farads are connected in series. When alternating voltage is applied to the series combination. The current flowing in this circuit is $i = 10\sqrt{2} Sin(314t - 65^o)$. Find the values of R and C. Given; $v = 400\sqrt{2} Sin(314t - 20^o)$.	6

UNIT - III

5	a.	Mention the advantages of 3 phase ac system over single phase.	6
	b.	With the help of phasor diagram, derive an expression for line voltage and the current for the star connected balanced load.	6
	c.	With the help of a neat circuit diagram, explain the constructional details of Induction type energy meter.	8
6	a.	With the help of phasor diagram and circuit show that two watt meters are sufficient to measure 3 phase power.	8
	b.	A balanced delta connected load of (8+j6) Ω per phase is supplied from a 3-phase 440 V source. Determine the line current, power factor and the total power.	6
	c.	With the help of neat diagram and switching table explain two way and three way control of lamps.	6

UNIT - IV

7	a.	With usual notations derive an expression for DC generator.	6
	b.	Define torque and derive the equation for the same.	6
	c.	A 3-phase, 16 pole, star connected alternator has 192 slots, with 8 conductor/slot and the conductors of each phase are connected in series. The coil span is 150 electrical degrees. Determine the line and phase emfs, if the machine runs at 375 rpm and flux/pole is 6.4×10^{-2} wbs. Given that K_d = 0.96.	8
8	a.	What do you mean by back EMF? What is its significance?	8
	b.	Explain the various types of synchronous generator with neat diagrams.	8
	c.	A series motor runs at 600 rpm while taking a current of 110 A from a 230 V supply. The resistances of the armature and field are 0.12 Ω and 0.03 Ω respectively. The useful flux/pole for 110 A is 0.024 wbs and that for 50 A is 0.0155 wbs. Calculate the speed when the current has fallen to 50 A.	6

Contd….3

UNIT - V

9 a. With usual notations, Derive an EM.F. Equation of a transformer. 6

b. With neat diagram, explain the constructional details of various types of Induction motors. 8

c. In a 25 kVA transformer, the iron losses are 350 W to 400 W respectively. Calculate the efficiency at $\frac{1}{4}^{th}$ full load at UPF and at $\frac{3}{4}^{th}$ of full load at 0.8 p.f. 6

10 a. Mention the different losses in a transformer and how are they minimized? 6

b. With relevant diagram, explain how does the rotating magnetic field is developed in Induction-motors. 8

c. A 250 kVA, 11000/415 V, 50 HZ, 1ϕ transformer has 80 turns on the secondary calculate,

(i) Rated primary and secondary currents

(ii) Number of primary and secondary turns 6

(iii) Maximum flux

(iv) Voltage induced per turn.

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