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

(An Autonomous Institution affiliated to VTU, Belagavi)

Second Semester, B.E. - Semester End Examination; May / June - 2018

Basic Electrical Engineering

(Common to All Branches)

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

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

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

c. A circuit consists of two parallel resistors having resistance of 20 Ω and 30 Ω respectively connected in series with 15 Ω. If current through 15 Ω resistor is 3 A. Find the following : 8

i) Current in 20 Ω and 30 Ω resistors

ii) The voltage across the whole circuit.

iii) The total power and power consumed in all resistances.

2 a. Define coefficient of coupling and establish the relation between self-inductances, mutual inductances with the coefficient of coupling. 7

b. A current of 20 A flows through two ammeters A and B in series, the potential difference across A is 0.2 V and across B is 0.3 V. Find how the same current will divide between A and B when they are in parallel. 8

c. Derive an expression for energy stored in Inductance of '*L*' Henry. 5

UNIT - II

3 a. Sketch the sinusoidal alternating current wave form and represent as well as define the following terms : 6

i) Instantaneous value ii) Peak value ii) Cycle and frequency

b. A series RLC circuit is composed of 100 Ω resistance, 0.1 H Inductance and 5 μF capacitance. A voltage $v(t) = 141.1\cos 377t$ V is applied to the circuit. Determine the current and voltages across the resistance, Inductance and capacitor. 8

c. Show that the power consumed by a pure inductance is zero and write the waveforms. 6

4 a. Define RMS value and derive an expression for RMS value of sinusoidally varying alternating current. 8

b. Derive an expression for average power in an RC series circuit, draw the related wave forms and vector diagram. 7

c. A coil of power factor 0.6 is in series with a 100 μF capacitor, when connected to a 50 Hz supply, the potential difference across the coil is equal to the potential difference across the capacitor. Find the resistance and inductance of the coil. 5

Contd…2

UNIT - III

5	a.	Obtain a relationship between line voltages and phase voltages in delta (Δ) connected balanced 3- phase system.	6
	b.	With a neat sketch, explain the construction and working of induction type single phase energy meter.	8
	c.	What is the necessity of earthing? Explain any one type of earthing.	6
6	a.	Show that the two wattmeters are sufficient to measure three phase power.	6
	b.	When three balanced impedances are connected in star, across a 3 phase 415 V, 50 Hz supply. The line current drawn is 20 A, at a lagging power factor of 0.4, Determine the parameter of the impedances in each phase.	8
	c.	With neat circuit diagram and switching table, explain three way control of lamp.	6

UNIT - IV

7	a.	With a neat sketch, explain the cross sectional view of DC machine.	8
	b.	Obtain an expression for emf of DC generator.	6
	c.	Find the load current of a DC shunt generator, if the shunt field resistance and armature resistances are 15 Ω and 0.02 Ω respectively, when the induced voltage on open circuit is 127 V and the terminal voltage on load is 120 V.	6
8	a.	State and explain Flemings left hand rule	6
	b.	Derive an expression for torque developed in a DC motor.	6
	c.	A shunt D.C. machine connected to 250 V. Supply has an armature resistance of 0.12 Ω and the field resistance of 100 Ω. Find ratio of the speed if the machine as a generator to the speed of motor. The line current in each case being 80 A.	8

UNIT - V

9	a.	What is the principle of operation induction motor?	8
	b.	Obtain an expression for emf of a transformer from first principles.	6
	c.	A 4 pole, 50 Hz Induction motor has a slip of 1% at no load, when operated at full load, the slip is 2.5%. Find the change in speed from no load to full load.	6
10	a.	What are the losses occurs in transformers? How they can minimize?	6
	b.	Explain the necessity of starter for 3 phase induction motor.	6
	c.	A 10 kVA a, 400/200 V single phase transformer has maximum efficiency of 98% at 90% full load at 0.8pF. Find its efficiency at full load and 0.6 pF.	8

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