U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

May 2023 Semester End Main Examinations

Programme: B.E. **Semester: I / II**
Branch: Common to all Branches **Duration: 3 hrs.**
Course Code: 21EE1ESBEE / 21EE2ESBEE **Max Marks: 100**
Course: BASIC ELECTRICAL ENGINEERING **Date: 16.05.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

MODULE-1

1 a) Find the value of resistance 'R' as shown in figure 1(a) below, so that current drawn from the source is 250mA. All the resistor values are in ohm. **05**

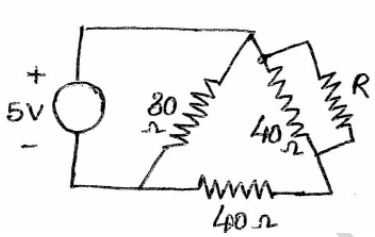

figure 1(a)

b) For the circuit shown below in figure 1(b), find the current supplied by each battery and power dissipated in 1Ohm resistor. **07**

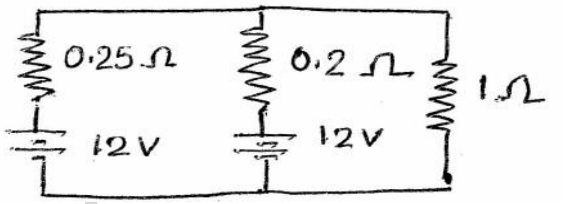

figure 1(b)

c) Define average value and RMS value of a sinusoidal alternating quantity. **04**

d) Show that in a pure capacitor current lead the voltage by 90°. **04**

MODULE - II

2 a) A series R-L circuit is energized by a sinusoidal voltage source. If the source voltage is $v(t) = V_{max}Sin\omega t$ show that the current $i(t)$ lags behind the voltage by an angle $\theta = \tan^{-1}\frac{\omega L}{R}$. **10**
Also show that the real power in the circuit is given by $V_{rms}I_{rms}\cos\theta$.

b) List the advantages of three phase systems. **04**

c) A voltage v = 100 sin 314 t is applied to a circuit consisting of a 25 Ohm resistor and 80μF capacitor in series. Determine: (a) an expression for the current flowing at any instant, (b) The power consumed. **06**

MODULE - III

3	a)	With the help of a neat sketch explain the construction of DC Machine.	**08**
	b)	A 250 V shunt motor on no load runs at 1000 rpm and takes 5 A. The field and armature resistances are 200 ohm and 0.25 Ohm respectively. Calculate the speed when the motor is loaded such that it takes 41A.	**08**
	c)	Derive the expression for the induced emf in the primary winding of a single phase transformer.	**04**

OR

4	a)	A DC shunt motor is connected to a supply of V volts. It is running at a speed of N rpm and developing a back EMF of Eb, when the armature current is Ia. Derive an equation for torque produced by the motor. Also show that the torque produced is directly proportional to armature current. Sketch the torque-armature current characteristics.	**08**
	b)	Compare core type and shell type transformers.	**04**
	c)	A 200 / 400 V, 10 kVA, 50 Hz, single phase transformer has at full load a copper loss of 320 W. If it has an efficiency of 95% at full load unity power factor, determine the iron loss. Also compute the efficiency of the transformer at 75% full load, 0.8 power factor lagging.	**08**

MODULE - IV

5	a)	What is the principle of working of a 3 phase induction motor? Explain different types of three phase induction motors.	**08**
	b)	Define slip. Can the slip be zero? Give reasons why the induction motor cannot run at synchronous speed.	**06**
	c)	A 12 pole, 500rpm, star connected alternator has 60 slots with 20 conductors per slot. The flux per pole is 0.02 weber and is distributed sinusoidally. The winding factor is 0.97. Calculate the (i) line EMF (ii) phase EMF (iii) frequency.	**06**

OR

6	a)	With the help of neat sketches explain the constructional details of salient and non-salient pole alternators.	**07**
	b)	Explain the concept of rotating magnetic field in three phase induction motor.	**07**
	c)	A three phase, 6 pole, 50 Hz induction motor has a slip of 1 % at no load and 3% at full load. Determine (a) synchronous speed, (b) no load speed, (c) full load speed, (d) frequency of rotor current at stand still and (e) frequency of rotor current at full load.	**06**

MODULE - V

7	a)	Draw a block diagram showing the structure of a power system.	**04**
	b)	Briefly explain two-part tariff	**04**
	c)	What is earthing? Why earthing is required? Explain pipe earthing	**06**
	d)	With the help of a block diagram explain the major parts of an electric vehicle.	**06**

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