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# **BMS College of Engineering, Bangalore-560019**

(Autonomous Institute, Affiliated to VTU, Belgaum)

## **December 2016 Semester End Main Examinations**

**Course: Basic Electrical Engineering**

**Course Code: 14EE1ICBEE**

**Duration: 3 hrs**

**Max Marks: 100**

**Date: 19.12.2016**

**Instructions:** Answer Any Five Full Questions, Choosing One From Each Unit

### **UNIT 1**

1. a) State and Explain KCL and KVL. 5
- b) Define magnetic Flux and Magnetic Flux Density 4
- c) Two storage batteries A and B are connected in parallel to supply a load of 0.3 Ohms. The open circuit emf of A is 11.7 V and that of B is 12.3 V. The internal resistances are 0.06 ohms and 0.05ohms respectively. Find the current supplied to the load. 8
- d) A coil consists of 750 turns and a current of 10 Amps in the coil gives rise to a magnetic flux of 1200 micro Webers. Calculate the inductance, rate of change of current and the self induced emf, when the current is reversed in 0.01 sec. 3

### **UNIT 2**

2. a) Derive an expression for the torque developed in the armature by a dc motor. 5
- b) Explain with figure, the construction of rotors in an induction motor. 8
- c) A four pole dc shunt motor takes 22.5 ampere from a 250 V supply. The armature resistance is 0.5 ohms and shunt field resistance is 125 ohms. The armature is wave- wound with 300 conductors. If the flux per pole is 0.02 wb, calculate i) speed & ii) torque developed. 7

### **OR**

3. a) Draw and explain armature torque verses armature current characteristics of dc shunt and series motor. 8
- b) Explain clearly the concept of rotating magnetic field in an induction motor. 8
- c) A 3 – phase, 6 poles, 60 hz induction motor has frequency of rotor current at full load of 1.8hz. Find the synchronous speed and slip at full load. 4

### UNIT 3

4. a) Define average value and derive an expression of average value considering a sinusoidal wave . 6
- b) Show that with relevant equation current lags the voltage by an angle ' $\phi$ ' in a series R-L circuit. 8
- c) A series circuit with  $R=10\ \Omega$ ,  $L = 50\text{mH}$  and  $C= 100\mu\text{f}$  is supplied with 200 V, 50hz, find i) the impedance ii) current iii) power and iv) power factor. 6

### UNIT 4

5. a) Derive the emf equation of a transformer. 6
- b) What are the losses that occur in a transformer? And explain 6
- c) In a 25kva, 2000/200 V, single phase transformer, the iron loss and full load copper losses are 350 and 400 watt respectively. Calculate the efficiency at unity power factor on full load and at half load. 8

### UNIT 5

6. a) What are the advantages of a three phase ac system? 4
- b) Obtain the relationship between line values and phase values in a 3 phase star connected system. 6
- c) What is the necessity of earthing in an electric system? 4
- d) Two wattmeters connected in a balanced system indicates 4500 watts and 500 watts, the later reading is obtained after reversing the current coil terminals. Find the total power and power factor. 6

### OR

7. a) Derive an expression and show that two wattmeter are sufficient to measure 3 phase power. 8
- b) Explain with figure, how a single bulb can be controlled with three different switches? 4
- c) Three equal impedance, each having a resistance of 8 ohms and inductive reactance of 6 ohms are connected in star across a 3 phase 440 V ac system. Find i) phase current ii) line Current and iii) total power consumed. 8

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