Roll No. .....

OLE-3010

B. Tech. 1st Semester (Common for All Branches)
Examination – April, 2021

BASIC ELECTRICAL ENGINEERING

Paper : ESC-EE-101-G

Time : Three Hours] *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt ***five*** questions in all, selecting ***one*** question from each Unit. Question No. **1** is ***compulsory***. All questions carry equal marks.

1. (a) Difference between active and reactive power.

(b) Difference between rms and average value of signal.

(c) Explain the physical significance of power factor in AC system.

(d) What do you mean by earthing ? What is its purpose ?

(e) Discuss characteristics of batteries.

(f) Classification of magnetic materials. $2.5 \times 6 = 15$

UNIT – I

2. (a) Explain series resonance and derive its expression. 7.5

(b) Find the current through 2 ohm, 3 ohm and 15 ohm resistances using nodal analysis in the circuit of fig. no. 1 7.5

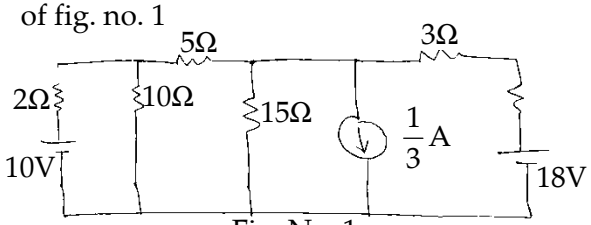

Fig. No. 1

3. (a) A resistor of 30 ohm and capacitor of unknown value are connected in parallel across a 110 V, 50 Hz, I-phase supply. The combination draws a current of 5 A from the supply. Find the value of unknown capacitance of the capacitor. This combination is connected across a 110 V supply of unknown frequency. It is observed that the total current drawn from the mains falls to 4A. Determine the frequency of the supply. Draw the relevant diagrams. 7.5

(b) Derive expression for resonant frequency bandwidth and impedance in series RLC circuit. 7.5

UNIT – II

4. (a) Discuss different types of losses in a transformer. Derive the condition for maximum efficiency of a transformer. 7.5

(b) Explain the purpose of performing open circuit test and short circuit test on single phase

transformer and how, short circuit test is performed ? Give the reason why short circuit test is performed only on high voltage side of the transformer ? 7.5

5. (a) Two wattmeters connected to read the total power in a 3 phase system supplying a balance load read 10.5 kW and –2.SkW respectively. Calculate the total power and power factor. Also explain the significance of (1) equal wattmeter readings and (2) a Zero reading on one wattmeter. 7.5

(b) Draw phasor diagram of different type of connections in 3-phase system and derive the expression to co-relate phase and line voltage and currents for any one type of connection. 7.5

UNIT – III

6. (a) Draw and explain the constructional features of 3-phase induction motors. 7.5

(b) Prove that 1-phase induction motor is not self starting. 7.5

7. (a) Describe different methods of speed control of dc shunt motor. 7.5

(b) Explain working principle, construction and applications of DC machine. 7.5

UNIT – IV

8. (a) Explain the different types of torques required for the working of measuring instruments. 7.5

(b) Calculate the monthly electricity bill for a household having used the following electrical loads on an average :

(i) 40 W tube lights, 4 Nos, 6 hours per day

(ii) 80 W ceiling fans, 3 Nos, 12 hours per day

(iii) 250 W electrical iron, 1 No, 1 hour per day

(iv) 80 W T.V. , 1 No, 6 hours per day

Supply voltage is 230 V, Single-phase, 50 Hz. Each unit of electricity charge is Rs. 6.50 only. 7.5

9. (a) State the main features of MCB and MCCB and their advantage over SFU. 7.5

(b) Explain the basic difference between moving iron type instruments and moving coil type instruments with the help of neat diagrams. 7.5