

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.  $2.5 \times 6 = 15$

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### 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

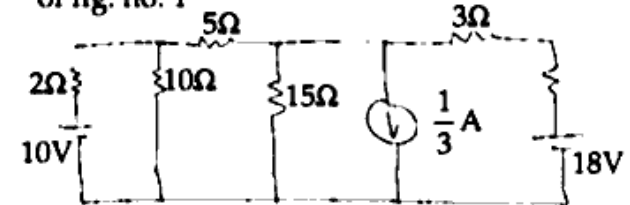


Fig. No. 1

3. (a) A resistor of 30 ohm and capacitor of unknown value are connected in parallel across a 110 V, 50 Hz, 1-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

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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 -2.5kW 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. https://www.mdustudy.com 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

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- (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



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