

**002202**

July 2023

**B.Tech. - II SEMESTER**  
**Basic Electrical Technology (ESC-101-A)**

Time : 3 Hours]

[Max. Marks : 75]

**Instructions :**

1. It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.
2. Answer any four questions from Part-B in detail.
3. Different sub-parts of a question are to be attempted adjacent to each other.

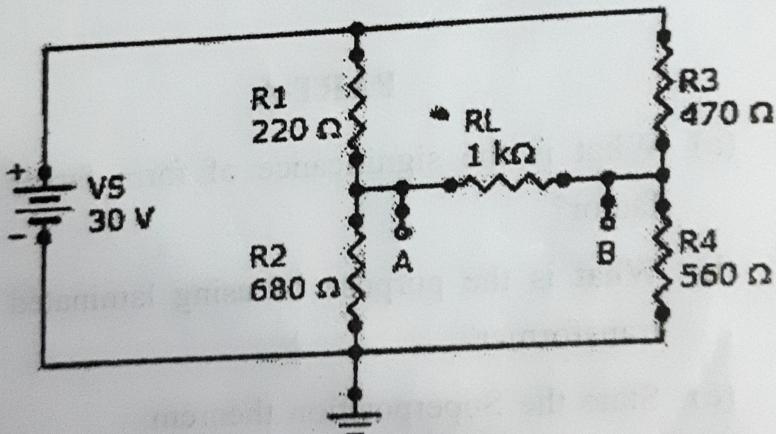
**PART-A**

1. (a) What is the significance of form factor and peak factor? (1.5)
- (b) What is the purpose of using laminated core in a transformer? (1.5)
- (c) State the Superposition theorem. (1.5)
- (d) Distinguish between active circuit and passive circuit. (1.5)
- (e) Define the voltage regulation of transformer. (1.5)

- (f) What is the difference between dependent source and independent sources? (1.5)
- (g) How do you make Single-Phase Induction Motor Self-Starting? (1.5)
- (h) How Back Emf is generated in a DC motor? What is the significance of back emf? (1.5)
- (i) What are the advantages of three-phase system over single-phase system? (1.5)
- (j) Explain the difference of fuse and MCB. (1.5)

### PART-B

2. (a) Find the Thevenin equivalent ( $V_{TH}$  and  $R_{TH}$ ) between terminals A and B of the circuit given below. (7.5)



- (b) A balanced three phase load consists of three coils each having resistance of  $4 \Omega$  and inductance  $0.02 \text{ H}$ . It is connected to a  $415 \text{ V}$ ,  $50 \text{ Hz}$ , 3-phase ac supply. Determine the phase voltage, phase current,

power factor and active power when the loads are connected in (i) Star (ii) Delta. (7.5)

3. (a) Two wattmeters are connected to measure the total power in a three-phase balanced circuit indicate 2000 W and 500 W respectively. Find the power factor of the circuit, (i) When both the readings are positive. (ii) When the latter is obtained after reversing the connections to the current coil of one instrument. (7.5)
- (b) State the maximum power transfer theorem. Derive the formula of maximum power for DC circuit. (7.5)
4. (a) Derive an expression for saving in conductor material in an autotransformer over two winding transformer of equal rating. State the advantages and disadvantages of Autotransformer over two winding transformer. (7.5)
- (b) With the help of phasor diagram, explain the working of transformer at No-load condition. (7.5)
5. (a) Explain the constructional details and operating principle of DC motor. (7.5)
- (b) Why synchronous motor is not self-starting. Explain it with suitable diagram. (7.5)

6. (a) A series circuit with  $R = 10$  ohms,  $L = 0.1$  H and  $C = 50 \mu\text{F}$  has an applied voltage  $V = 50 \angle 0^\circ$  V with a variable frequency. Find (i) the resonant frequency (ii) the value of frequency at which maximum voltage occur across inductor (iii) the quality factor of the coil. (7.5)

(b) Determine the RMS value, Average value, Form factor for a half wave rectified Sine wave. (7.5)

7. Write short note on :

(i) Earthing and its type.

(ii) Power factor Improvement.

$(7.5 \times 2 = 15)$

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