

Roll No.

TEE-101

B. TECH. (FIRST SEMESTER)

END SEMESTER EXAMINATION, Jan., 2023

BASIC ELECTRICAL ENGINEERING

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) Define the following terms : (CO1, CO2)

(i) Active and passive elements

(ii) Form factor and peak factor in single phase A. C. circuit

(iii) Thevenin's theorem

(iv) Ideal and practical voltage source

(v) Short circuit and open circuit condition

P. T. O.

- (b) Write down different steps of node voltage analysis. In the network shown in Fig. 1, find the magnitude of each branch current by mesh analysis. (CO1, CO2)

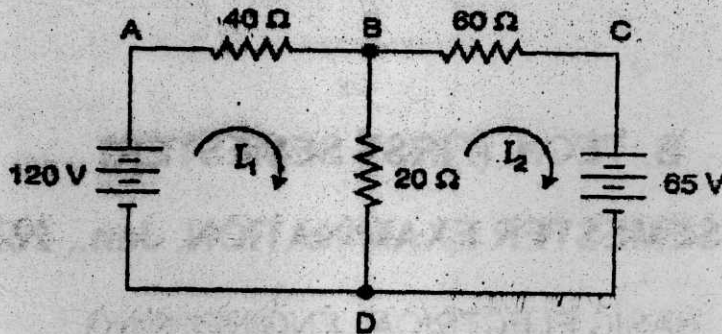


Fig. 1

- (c) State Kirchhoff's voltage law with proper example. For the circuit shown in Fig. 2, find the equivalent resistance across a-b by using star-delta transformation. (CO1, CO2)

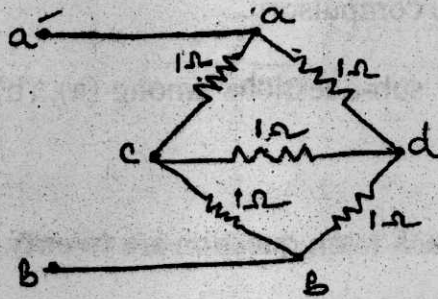


Fig. 2

2. (a) Find the average value, r.m.s. value, form factor, and peak factor of ac voltage whose waveform is shown in Fig. 3. (CO2, CO3)

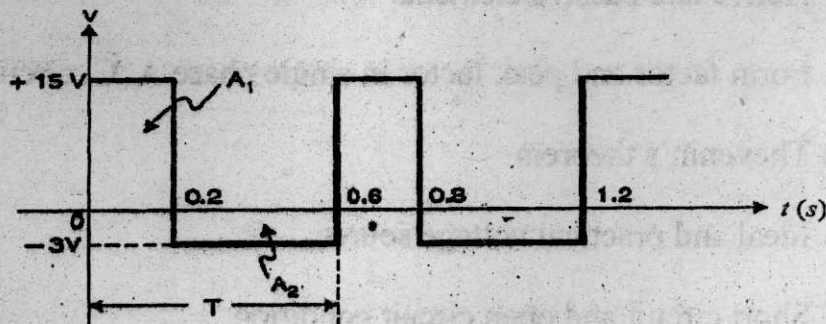


Fig. 3

- (b) Explain the working of single phase purely inductive circuit with proper phasor diagram. Also derive the expression for instantaneous average power. (CO2, CO3)
- (c) Differentiate between electrical wire and cable. Give classification of electrical cable and explain any one. (CO2, CO3)
3. (a) Derive the condition of maximum power transfer in D.C. circuit. Also derive the expression for maximum efficiency in D.C. circuit at maximum power transfer condition. (CO1, CO2, CO4)
- (b) A pure inductance of 318 mH is connected in series with a pure resistance of 75Ω . The circuit is supplied from 50 Hz source and the voltage across 75Ω resistor is found to be 150 V. Calculate the supply voltage and the phase angle. (CO1, CO2, CO4)
- (c) What is the importance of switchgear in electrical system ? Classify switchgear on the basis of voltage level. Explain miniature circuit breaker (MCB) in detail. (CO1, CO2, CO4)
4. (a) State Superposition theorem in D. C. circuit. Using superposition theorem, find the current through $1 \text{ k}\Omega$ resistor as shown in Fig. 4. (CO1, CO5, CO6)

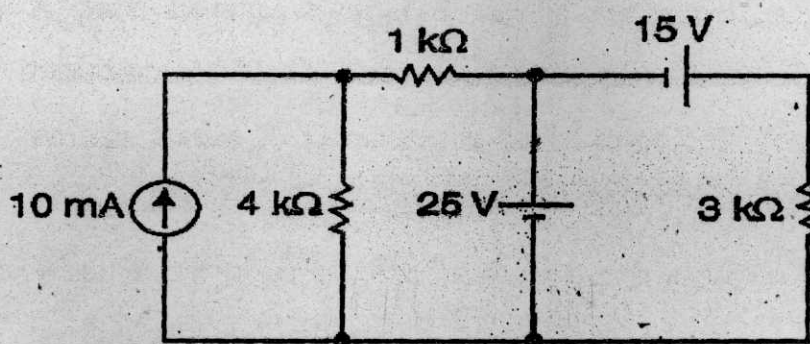


Fig. 4

- (b) What is the need of earthing in electrical system ? How many types of electrical earthing are possible ? (CO1, CO5, CO6)
- (c) An 8-pole wave connected D.C. generator has 1000 armature conductors and flux/pole 0.035 Wb. At what speed it must be driven to generate 500 V. (CO1, CO5, CO6)
5. (a) Define voltage triangle, impedance triangle, and power triangle for single phase series R-L circuit. (CO2, CO6)
- (b) An alternating current i is given by; $i = 141.4 \sin (314 t)$.
Find : (CO2, CO6)
- (i) the maximum value
 - (ii) frequency
 - (iii) time period
 - (iv) the instantaneous value when t is 3 ms.
- (c) Give classification of electrical machines. Also explain the working principle of electrical generator. (CO2, CO6)

