

END TERM EXAMINATION

SECOND SEMESTER [B.TECH] JULY 2023

Paper Code: ES-108

Subject: Electrical Science

Time: 3 Hours

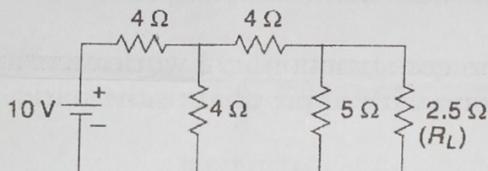
Maximum Marks: 75

Note: Attempt five questions in all including Q.No. 1 which is compulsory. Select one question from each unit.

- Q1 a) Defining the following terms: [3]
a. Active Element, b. Passive Element, c. Circuit vs. Network
b) What is resonance in the AC circuit? How is it generated in series and parallel circuit? [3]
c) What are the types of torques in Indicating Type measuring instruments? [3]
d) Interpret the different types of losses in the 1φ Transformer [3]
e) List out the application of DC Motor and generator? [3]

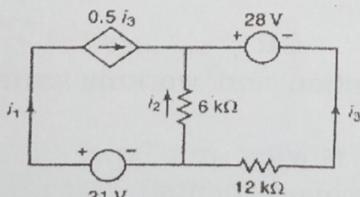
UNIT-I

- Q2 a) State and proof the Maximum Power Transfer theorem having efficiency 50% with suitable expressions and diagram. [7.5]
b) Evaluate the current through load resistance R_L using Norton's Theorem. [7.5]



OR

- Q3 a) Distinguish between dependent and independent sources. How do you transform a voltage source into a current source? [7.5]
b) Calculate i_1 , i_2 , and i_3 in the given circuit [7.5]



UNIT-II

- Q4 a) Illustrate the basic terminology used in AC Systems with the help of waveforms? Also, Differentiate single phase and three phase circuit. [7.5]

P.T.O.

- b) A Circuit consists of four load in series and the voltage across these loads is given by following relations in volts:
 $v_1 = 50 \sin \omega t$; $v_2 = 25 \sin(\omega t + 60^\circ)$
 $v_3 = 40 \cos \omega t$; $v_4 = 30 \sin(\omega t - 45^\circ)$
Calculate the supply voltage in similar form. [7.5]

OR

- Q5 a) Find the RMS and Average value of the following: [7.5]
i. Sinusoidal wave, ii. Half Rectifier Wave, iii. Triangular wave,
iv. Square wave, v. Full Rectifier Wave
- b) A 230 V 50 Hz supply is applied across a resistor of 10 Ω in parallel with a pure inductor. The total current is 25 A. What should be the value of the frequency if the total current is 36 A? [7.5]

UNIT-III

- Q6 a) Explain the construction and working principle of DC motor with suitable schematic diagram. [7.5]
- b) A dc shunt generator has an induced voltage of 220 V on open circuit. When the machine is on load the voltage is 200 V. Find the load current if the field resistance is 100 Ω and armature resistance is 0.2 Ω . [7.5]

OR

- Q7 a) Classify the starting methods of 3- ϕ induction motor and also discuss the star-delta starting method in detail with suitable diagram. [7.5]
- b) Illustrate the construction and working principle of Synchronous machine along with appropriate schematic. [7.5]

UNIT-IV

- Q8 a) Explain the construction and working principle of Single Phase Transformer. [7.5]
- b) Compose the following phasor connections of 3 ϕ Transformer: [7.5]
(i) Yd11 (ii) D d 6 (iii) Yd1

OR

- Q9 a) Illustrate the construction and working principle of the following instruments. [7.5]
i) Attraction Type -Moving Iron Type
ii) Electro-dynamic instruments
- b) A transformer has its maximum efficiency of 0.975 at 20 kVA at unity p.f. During the day it is loaded as follows: [7.5]
10 hr: 3 kW at 0.6 p.f.
8 hr: 10 kW at 0.8 p.f.
6 hr: 20 kW at 0.9 p.f.
Find the all-day efficiency.
