(Please write your Exam Roll No.) *Exam Roll No. .....*

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]**

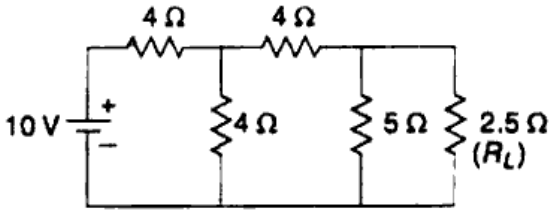
d) Interpret the different types of losses in the 1ϕ Transformer **[3]**

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]**

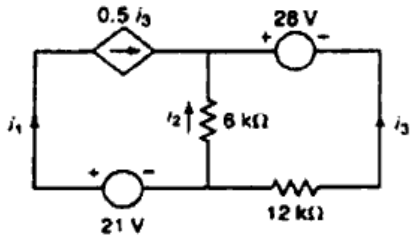
b) Evaluate the current through load resistance RL using Norton's Theorem. **[7.5]**



OR

Q3 a) Distinguish between dependent and independent sources. How do you transform a voltage source into a current source? **[7.5]**

b) Calculate *i1*, *i2*, and *i3* 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:
$v1 = 50 \sin \omega t$; $v2 = 25 \sin(\omega t + 60°)$
$v3 = 40 \cos \omega t$; $v4 = 30 \sin(\omega t - 45°)$
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 W 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 3ϕ 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.

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