Code No.: EE104ES | R22 | H.T.No. | | | 8 | R | | | | | |

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
I–B.TECH–I–Semester End Examinations (Regular) - March- 2023
BASIC ELECTRICAL ENGINEERING
(Common for CSC, CSD, CSM)

[Time: 3 Hours] **[Max. Marks: 60]**

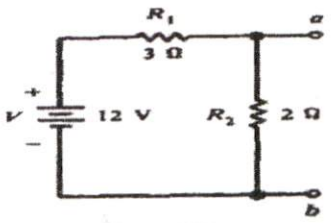
Note: This question paper contains two parts A and B.
Part A is compulsory which carries 10 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A **(10 Marks)**

1. a) What is inductance? [1M]
   b) State KCL. [1M]
   c) Define r.m.s value of a sinusoidal waveform. [1M]
   d) Give the relation between line and phase quantities of 3-phase star connection. [1M]
   e) What is an Ideal transformer? [1M]
   f) Give the condition for maximum efficiency of a transformer. [1M]
   g) What is the function of commutator in d.c generator? [1M]
   h) Give the expression for torque of a d.c motor. [1M]
   i) Define slip. [1M]
   j) State various types of 3-phase Induction motors. [1M]

PART-B **(50 Marks)**

2. a) State and explain Norton's theorem. [5 M]
   b) Find the Thevenin's equivalent circuit across a, b terminals of the circuit shown below. [5 M]



OR

3. a) State and explain superposition theorem. [5 M]
   b) Discuss the transient current growth in an series R-L circuit excited by d.c source. [5 M]

4. a) Explain (i) active power (ii) reactive power [4 M]
   b) A *RL* series ac circuit has a current of 1 A peak with $R = 500\ \Omega$ and $X_L = 50\ \Omega$. Calculate V_R, V_L, V_T, and θ. Draw the phasor diagram of V_T and *I*. [6 M]

OR

5. a) Derive an expression for resonant frequency of R-L-C series circuit excited by a.c source. [5 M]
   b) 20-Ω resistor and a 15Ω inductive reactance are placed in parallel across a 120-V ac. Find the branch currents and the total current, [5 M]

6. a) Explain various losses that are occurred in a single phase transformer. [6 M]
b) A single phase transformer reduces the 120 V in the primary to 8 V on the secondary. If there are 150 turns on the primary and 10 turns on the secondary, find the voltage ratio and turns ratio. [4 M]

OR

7. a) Obtain the equivalent circuit of transformer. [5 M]
b) A 250-KVA, 2400/480-V transformer has copper losses of 3760 W and core losses of 1060 W. What is the efficiency when the transformer is fully loaded at 0.8power factor? [5 M]

8. a) Derive an e.m.f equation of a d.c generator. [5 M]
b) Explain the working principle of d.c motor. [5 M]

OR

9. a) Draw the torque –speed characteristics of all d.c motors. [5 M]
b) Find the back emf of a motor when the terminal voltage is 240V and the armature current is 50 A. The armature resistance is 0.08 Ω. The field current is negligible. What is the power developed by the motor armature? [5 M]

10. Explain the constructional details and working principle of 3-phase induction motor. [10M]

OR

11. Why starter is needed for 3-phase Induction Motor? Explain the operation of star-delta starter with a neat circuit diagram. [10M]

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