CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
I–B.TECH–I–Semester End Examinations (Regular) - December - 2025
BASIC ELECTRICAL ENGINEERING
(Common for ECE, CSM & CSD)

[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 are the passive elements? [2M]
   b) What is the relation between phase and line quantities of current and voltage in a 3-phase balanced star-connected system? [2M]
   c) Define the voltage regulation of a transformer. [2M]
   d) What is the significance of a back e.m.f. in a d.c. motor? [2M]
   e) What is the rotor frequency of a 3-ϕ Induction motor with a slip of 4% and a supply frequency of 50 Hz? [2M]
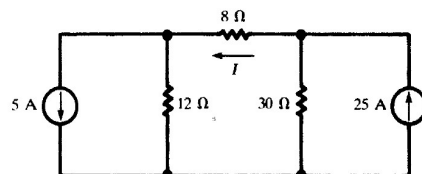
PART-B **(50 Marks)**

2. a) State and explain Kirchhoff's laws. [4M]
   b) Find the value of current I_1, I_2, and I_3 from the circuit given below. [6M]
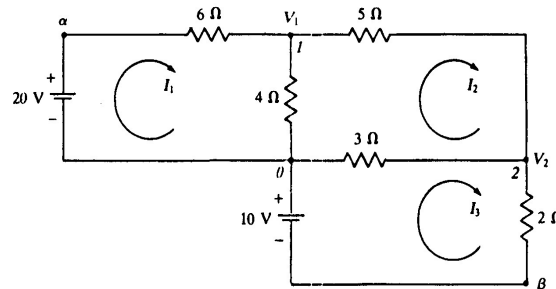
OR

3. a) State and explain Thevenin's theorem. [4M]
   b) Find the current flowing through the 8Ω resistance shown in the figure below using the superposition theorem. [6M]

4. a) Obtain an average and r.m.s value of a sinusoidal quantity. [5M]
   b) The equation of an alternating current is i(t)=250 sin(314t). Find (i) Maximum value, (ii) RMS value, (iii) Average value, (iv) Form factor, (v) Peak factor. [5M]

OR

5. a) Obtain an expression for the resonant frequency of a series R-L-C circuit excited by an alternating voltage with variable frequency. [5M]
   b) An 80Ω capacitive reactance (X_c) and a 60-Ω Resistance are in series across a 240-V A.C source. Calculate Z, I, and power factor angle. [5M]

6.a) Explain the working principle of a single-phase transformer with a neat sketch. [5M]
  b) Derive an e.m.f equation of a single-phase transformer. [5M]

OR

7.a) A 250 kVA-rated single-phase transformer has a full-load copper loss of 1.2 kW and an iron loss of 0.8 kW. Determine the transformer efficiency at full load and half full load with a lagging power factor of 0.8. [5M] [5M]
  b) Explain the construction of Auto transformer with neat sketch.

8. Explain the construction of a d.c machine with a neat sketch. [10M]

OR

9.a) Derive an expression for the torque developed by a d.c motor. [5M]
  b) What are the types of d.c motors? Explain in brief. [5M]

10. Explain how the rotating magnetic field is produced in a 3-ϕ Induction Motor. [10M]

OR

11. Give the constructional details of a synchronous generator and also explain its working principle. [10M]

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