CMR ENGINEERING COLLEGE:: HYDERABAD
UGC AUTONOMOUS
I–B.TECH–II–Semester End Examinations (Supply) - January- 2025
BASIC ELECTRICAL ENGINEERING
(Common for ECE, CSE, IT)

[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.

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PART-A   **(10 Marks)**

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1. a) State KVL. [1M]
   b) What are the various types of current sources? [1M]
   c) Define R.M.S value of a sinusoidal quantity. [1M]
   d) What is power factor? [1M]
   e) Define turns ratio of a transformer. [1M]
   f) What is Ideal transformer? [1M]
   g) Why is yoke required in a DC machine? [1M]
   h) What is the significance of back emf? [1M]
   i) Give any one application of 3-phase Induction motor. [1M]
   j) Define slip speed of 3-phase Induction motor. [1M]

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PART-B   **(50 Marks)**

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2. a) State and explain Norton' theorem. [5M]
   b) Give the V-I relationship for R, L and C elements. [5M]

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OR

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3. a) State and explain Thevenin's theorem. [5M]
   b) Determine the current flowing in each resistance of the network shown in figure below. [5M]
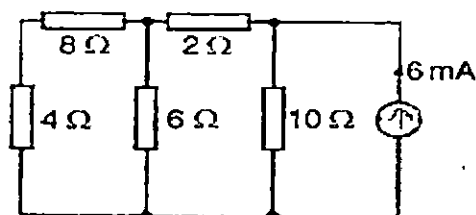
4. a) Obtain an expression for resonant frequency of a series R-L-C circuit excited by an alternating Voltage of variable frequency and constant voltage. [6M]

   b) A series R-L circuit having a resistance of 4 Ω and 3 Ω inductive reactance is fed by 200 V, 1-φ supply. Find current drawn by the circuit. [4M]

OR

5. Three coils each having resistance 3Ω and inductive reactance $4\ \Omega$ are connected in star to a 440 V, 3-phase supply. Calculate (i) the line and phase voltages and (ii) the phase and line currents. [10M]

6. a) Explain the working principle of single phase transformer. [5M]
   b) Draw the equivalent circuit of a transformer when referred to primary from the fundamentals. [5M]

OR

7. a) Explain different losses of a transformer. [5M]
   b) A 100-kVA, 3300/400-V, 50 Hz, 1-phase transformer has 110 turns on the secondary. Calculate the approximate values of primary and secondary full-load currents, the maximum value of flux in the core and the number of primary turns. [5M]

8. a) Explain the working principle of a d.c generator. [5M]
   b) A 4-pole lap wound generator has 250 conductors on armature. It is driven by a prime mover at a constant speed of 800 rpm. If the flux per pole is 0.2 Wb, Calculate the generated emf? [5M]

OR

9. a) Derive an expression for torque developed by d.c motor. [6M]
   b) Draw the torque vs. speed characteristics of all d.c motors [4M]

10. a) A 3-phase, 50 Hz, 6 pole 3-ph induction motor has full load slip of 3 %. Find [6M]
    (i) synchronous speed (ii) motor speed. [4M]
    b) Explain the torque-speed characteristics of 3-phase Induction motor?

OR

11. Explain the constructional details and working principle of synchronous generator. [10M]

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