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

[Time: 3 Hours]   **[Max. Marks: 70]**

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 20 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.
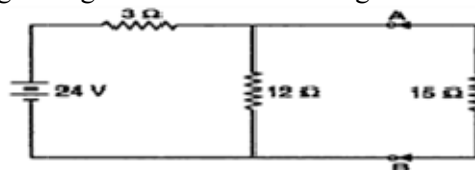
PART-A   (20 Marks)

1. a) State the limitations of superposition theorem. [2M]
   b) State Kirchhoff's voltage law. [2M]
   c) Define active power and reactive power. [2M]
   d) Give the phase and line quantities relation in 3-phase Delta connection. [2M]
   e) State different types of transformers. [2M]
   f) What is an auto transformer? [2M]
   g) What is the significance of the back e.m.f of a d.c motor? [2M]
   h) What is the function of a commutator in a d.c generator? [2M]
   i) Define slip of an Induction motor. [2M]
   j) State various staring methods of a 3-phase Induction motor. [2M]

PART-B   (50 Marks)

2. a) State and explain Thevenin's theorem. [5M]
   b) Obtain an expression for transient current in a R-C series circuit excited by D.C source. [5M]

OR

3. a) State and explain Norton's theorem. [5M]
   b) Find the current flowing through 15 Ω resistance using Norton's theorem. [5M]

4. a) A voltage of 125 V at 50 Hz is applied across a non- inductive resistor connected in series with a capacitor. The current is 2.2 A. The power loss in the resistor is 96.8 W. calculate the resistance and capacitance. [5M]
   b) Obtain an expression for resonance frequency of series R-L-C circuit. [5M]

OR

5. a) Derive an expression for power in a single phase circuit contains R, L elements in series across sinusoidal voltage. [5M]
   b) A simple series circuit consists of a capacitance of reactance 200 ohms and a resistance R of 50 ohms is connected to a 200V, 50Hz, 1φ a.c supply. What are the values of current, active power, power factor of the circuit? [5M]

6. Derive an e.m.f equation of a single phase transformer.

OR

7.a) A 60 kVA, 1600 V/100 V, 50 Hz, single-phase transformer has 50 secondary windings. [5M]
       Calculate (a) the primary and secondary current, (b) the number of primary turns, and (c) [5M]
       the maximum value of the flux.
  b) Explain the working principle of a transformer.

8.a) Explain with relevant diagrams the different types of DC. generators. [5M]
  b) A 6 pole lap wound D.C. Generator runs at 850rpm. And each pole has a flux of [5M]
       12 mWb. If there are 150 conductors in series between each pair of brushes, what is the
       value of generated e.m.f?

OR

9.a) Explain different characteristics of a d.c series motor. [5M]
  b) A 220 V D.C shunt motor has an armature resistance of 0.5Ω and takes a current of 40 A [5M]
       on full loads. By how much must the main flux be reduced to raise the speed by 50% if
       the developed torque is constant?

10. Derive the rotating magnetic field produced in a 3-phase Induction Motor is constant. [10M]

OR

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

****