

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS

I-B.TECH-I-Semester End Examinations (Supply) - June - 2025

BASIC ELECTRICAL ENGINEERING

(Common for IT, CSD, ECE, CSC, 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

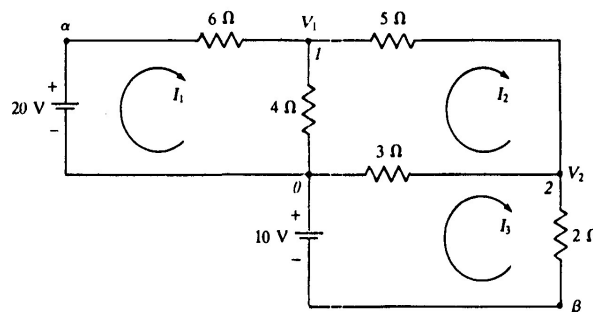
(10 Marks)

1. a) Draw the V-I characteristic of a practical voltage source. [1M]
- b) Draw the equivalent circuit of Thevenin's theorem. [1M]
- c) What is apparent power? [1M]
- d) What is the line and phase voltage relationship in a 3-phase balanced star connection? [1M]
- e) What is the efficiency of an ideal transformer? [1M]
- f) Define the voltage regulation of a transformer. [1M]
- g) What is the function of a yoke in a d.c generator? [1M]
- h) Give the back e.m.f equation of a d.c motor. [1M]
- i) What is the speed of the rotating magnetic field produced in a 3-phase induction motor? [1M]
- j) Draw the typical torque-slip characteristic of a 3-phase induction motor. [1M]

PART-B

(50 Marks)

- 2.a) State and explain Norton's theorem. [5M]
- b) Find the value of mesh currents I_1 , I_2 , and I_3 from the circuit given below. [5M]



OR

- 3.a) Obtain an expression for transient current flowing through the RL series circuit excited by D.C source at $t = 0^+$. [5M]
- b) State and explain the superposition theorem. [5M]
- 4.a) Obtain an expression for the form factor of a sinusoidal quantity. [5M]
- b) A series RLC circuit has $R=2\Omega$, $L=2H$, and $C=2\mu F$. Find the resonant frequency, bandwidth and quality factor at resonance. [5M]

OR

- 5.a) Explain the following: (i) impedance and (ii) admittance of a.c circuits. [4M]
- b) A coil having resistance 6Ω and inductive reactance 8Ω are connected in series to a 200V, 1-phase supply. Calculate the impedance and current. [6M]

- 6.a) Explain the principle of operation of a single-phase transformer. [6M]
b) A transformer has 300 primary turns and 75 secondary turns. The primary and secondary resistances are $0.3 \, \Omega$ and $0.01 \, \Omega$ respectively and the corresponding leakage reactances are $1.2 \, \Omega$ and $0.05 \, \Omega$ respectively. Find the equivalent resistance and reactance referred to the primary winding. [4M]

OR

- 7.a) Explain different 3-phase transformer connections. [5M]
b) Draw the circuit diagram of Autotransformer and explain its operation. [5M]
- 8.a) Derive an e.m.f equation of a d.c generator. [6M]
b) Draw the circuit diagram of (i) d.c series generator and (ii) d.c shunt generator. [4M]

OR

- 9.a) Explain the working principle of a d.c motor. [6M]
b) Explain different characteristics of a d.c shunt motor. [4M]

10. Explain the construction and working principle of a 3-phase Induction motor. [10M]

OR

- 11.a) Give the constructional details of a 3-phase Synchronous generator. [6M]
b) Explain the different losses of a 3-phase Induction motor. [4M]
