Code No.: EE204ES | R20 | H.T.No. | | | 8 | R | | | | | |

CMR ENGINEERING COLLEGE: HYDERABAD
UGC AUTONOMOUS
I–B.TECH–II–Semester End Examinations (Supply) - September- 2023
BASIC ELECTRICAL ENGINEERING
(Common for CSM, ECE)

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

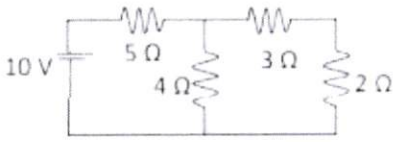
Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A **(20 Marks)**

1. a) What are the types of Energy Sources? [2M]
   b) State Kirchhoff's laws. [2M]
   c) State Thevenin's theorem. [2M]
   d) Define form factor and peak factor. [2M]
   e) Derive the EMF equation of 1-phase Transformer. [2M]
   f) Explain the operation of Auto Transformer. [2M]
   g) What is the function of commutator and brushes in DC motors? [2M]
   h) On what factors do Hysteresis and Eddy current losses depend? [2M]
   i) Draw torque slip characteristics of induction motor. [2M]
   j) A 3-phase, 4-pole, 50 Hz induction motor is running at 1455 rpm. Find the slip speed and slip. [2M]

PART-B **(50 Marks)**

2. Find the current through 2 Ω using Thevenin's theorem. [10M]



OR

3. Derive the time domain analysis of first-order RC circuits. [10M]

4. Derive the expression for RMS value & average value of alternating current wave I = Im Sin ωt. [10M]

OR

5. Derive the relation between phase and line voltages and currents in balanced three phase star connection. [10M]

6. Explain the operation of a single-phase transformer on lagging load and draw the relevant phasor diagram. [10M]

OR

7. A 50 kVA, 1000/10000 V, 50Hz single phase transformer has iron loss of 1200W. The copper loss with 5 A in the high voltage winding is 500 W. Calculate the efficiency at i) 50 % iii) 100 % of normal load at power factor of 0.8. [10M]

8. Explain the principle of operation of DC generator and derive the EMF equation of a DC generator. [10M]

OR

9. The power input to the rotor of a 440 V, 50 Hz, 6 pole, 3-phase induction motor is 60 KW. The rotor emf frequency is 90 cycles per minute. Calculate the slip, rotor speed, rotor copper loss, mechanical power developed and rotor resistance/phase if the rotor current is 60 A. [10M]

10. With a neat sketch, explain the principle of production of rotating magnetic field in a 3-phase induction motor. [10M]

OR

11. 3-φ, 4-pole induction motor is supplied from 3-φ, 50Hz ac supply. Find [10M]
    i. Synchronous speed
    ii. Rotor speed when slip is 3%
    iii. The rotor frequency when runs at 500r.p.m.

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