Code No.: R22EE104ES | R22 | H.T.No. | | | 8 | R | | | | | |

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

[Time: 3 Hours] **[Max. Marks: 60]**

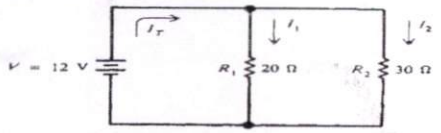
Note: This question paper contains two parts A and B.
Part A is compulsory which carries 10 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A **(10 Marks)**

1. a) Define KCL. [1M]
   b) What is Ideal current source? [1M]
   c) What is the average active power consumed by pure capacitor when excited by a.c sinusoidal voltage? [1M]
   d) What is the relation between line voltage and phase voltage of a 3-phase star connected system? [1M]
   e) Which losses are variable in a single phase transformer? [1M]
   f) Define turns ratio of a transformer. [1M]
   g) What is the function of a magnetic yoke in a d.c generator? [1M]
   h) Define the efficiency of a d.c motor. [1M]
   i) Define slip of a 3-phase Induction Motor. [1M]
   j) Name one of the starter used in a 3-phase Induction Motor. [1M]

PART-B **(50 Marks)**

2.a) State and explain Norton's theorem. [5M]
   b) For the circuit in Fig below, find (i) the total resistance, (ii) each branch current, and (iii) the total current. [5M]



OR

3. Obtain the time response of R-L series circuit excited by d.c supply. [10M]

4.a) Define (i) real power (ii) reactive power and (iii) apparent power. [6M]
   b) If the peak voltage for an ac wave is 60 V, what are its average and r.m.s values? [4M]

OR

5. RL series ac circuit has a current of 1 A peak with $R = 500\Omega$ and $X_L = 50\Omega$. Calculate V_R, V_L, V_T, and power factor angle. [10M]

6. Derive an e.m.f equation of a single phase transformer. [10M]

OR

7.a) Draw the equivalent circuit of a single phase transformer. [5M]
   b) A 250-kVA 2400/480-V transformer has copper losses of 3760 W and core losses of 1060 W. What is the efficiency when the transformer is fully loaded at 0.8 p.f? [5M]

8.a) Derive the e.m.f equation of a d.c generator. [8M]

b) The terminal voltage of a 75-kW shunt generator is 600V at rated load. The resistance of the shunt field is 120 Ω and the armature resistance is 0.2Ω. Find the generated e.m.f. [2M]

OR

9.a) Explain the working principle of a d.c motor with a neat sketch. [7M]

b) State different losses that occur in a d.c motor. [3M]

10. Draw and explain the torque-slip characteristics of 3-phase Induction Motor. [10M]

OR

11. Explain the constructional details and working principle of 3-phase synchronous generator. [10M]

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