27/25

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

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
I–B.TECH–I–Semester End Examinations (Regular) - January - 2025
BASIC ELECTRICAL ENGINEERING
(Common for ECE, IT, CSD, CSC, CSM)

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

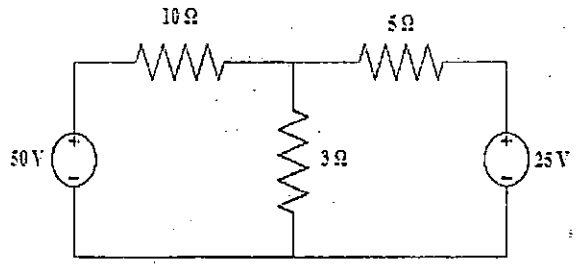
Note: This question paper contains two parts A and B.
Part A is compulsory which carries 10 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A **(10 Marks)**

1.	a)	Draw the V-I characteristic of an Ideal voltage source.	[1M]
	b)	What is the time constant of the R-L series circuit?	[1M]
	c)	Define reactive power.	[1M]
	d)	What is the current relationship between the line and phase values of a 3-phase balanced delta connection?	[1M]
	e)	What is the efficiency of a transformer?	[1M]
	f)	What happens if d.c supply is connected to a transformer?	[1M]
	g)	What is the function of brushes in a d.c generator?	[1M]
	h)	What are the losses of a d.c motor?	[1M]
	i)	Define the slip of a 3-phase Induction Motor.	[1M]
	j)	What is the speed of a synchronous generator?	[1M]

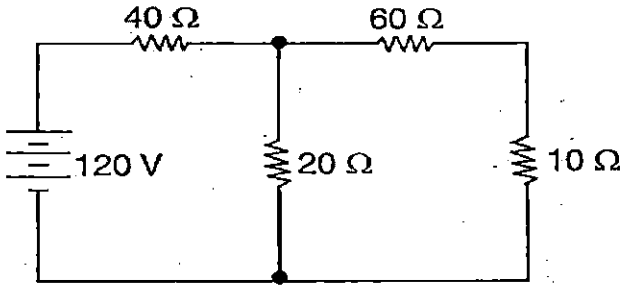
PART-B **(50 Marks)**

2.	a)	State and explain Kirchoff's laws.	[5M]
	b)	Find the current flowing through each resistance using Kirchhoff's laws.	[5M]



OR

3.	a)	State and explain the superposition theorem.	[5M]
	b)	Using Norton's theorem, find the current in a 10 Ω resistor in the circuit shown in the figure below.	[5M]



4.a) Define the average value and derive the expression for the same of a sinusoidal alternating quantity. [6M]

b) A series R-C circuit having a resistance of 8 Ω and 6 Ω capacitive reactance is fed by 230 V, 1-ϕ supply. Find the current, power drawn by the circuit and power factor. [4M]

OR

5.a) Derive resonant frequency, bandwidth of a series R-L-C resonance circuit. [6M]

b) Determine the power factor and the input power for a circuit with $v = 50 \sin(\omega t + 10^0)$ and $I = 2 \sin(\omega t + 40^0)$ A. [4M]

6.a) Derive an e.m.f equation of a 1-phase transformer. [6M]

b) The maximum flux density in the core of a 220/4400 V, 50Hz single-phase transformer is $1.25 Wb/m^2$. If the emf per turn is 6V, determine (i) primary and secondary turns and (ii) the area of the core [4M]

OR

7.a) Draw the equivalent circuit of a single-phase transformer. [6M]

b) The iron and full-load copper losses in a 100KVA single-phase transformer are 400 and 600W respectively. Calculate the efficiency at half-full load, 0.8 p.f. lag. [4M]

8. Explain the construction and working of a d.c generator with a neat sketch. [10M]

OR

9.a) Derive an expression for the torque equation of a d.c motor. [6M]

b) Explain the significance of a back e.m.f in a d.c motor. [4M]

10.a) Draw the torque-slip characteristics of a 3-phase Induction motor. [5M]

b) Explain any one starter used in 3-phase Induction Motor. [5M]

OR

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

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