Code No: 182AC **R22**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech I Year II Semester Examinations, February - 2025
BASIC ELECTRICAL ENGINEERING
(Common to ECE, CSE(AI&ML), CSE(IOT), AI&DS, AI&ML)

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

Note: This question paper contains two parts A and B.
i) **Part- A** for 10 marks, ii) **Part - B** for 50 marks.
- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of **ten questions** (numbered from 2 to 11) **carrying 10 marks each**. From each unit, there are two questions and the student should answer one of them. Hence, the student should answer five questions from Part-B.

PART- A

(10 Marks)

1.a)	Write the limitations of Ohm's law.	[1]
b)	Write the Time Constant for RC Circuits.	[1]
c)	Define Average Value.	[1]
d)	Define Active Power.	[1]
e)	Why transformer is rated in KVA?	[1]
f)	Define Eddy current loss.	[1]
g)	Draw the slip torque characteristic of 3-phase Induction Motor.	[1]
h)	What are the parts of a synchronous generator?	[1]
i)	What is the function of S.F.U?	[1]
j)	Abbreviate the term "ELCB".	[1]

PART - B

(50 Marks)

2.a) Find the Thevenin's voltage with respect to the load resistance(R_L) shown in figure 1.

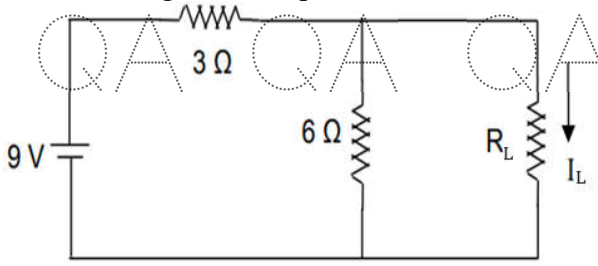

Figure 1

b) A capacitor in an RC circuit with R = 25 Ω and C = 50 μF is being charged with initial zero voltage. What is the time taken for the capacitor voltage to reach 40 % of its steady state value? [6+4]

OR

3.a) In the circuit shown in the figure 2, find the value of Io and Vo?

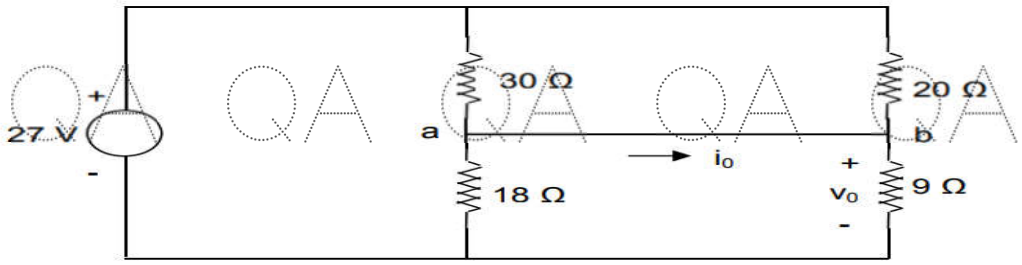

Figure 2

b) Using current division rule, find the current flowing through I_{FE}? (Figure 3) [5+5]

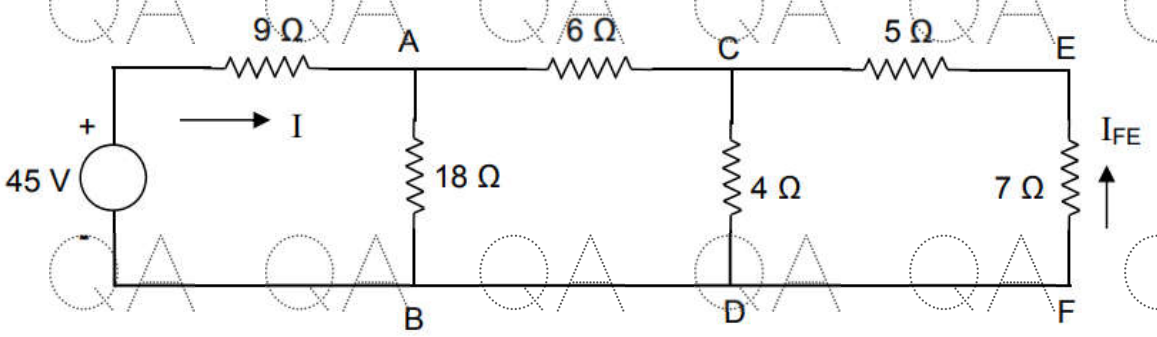

Figure 3

4.a) A load consisting of 40 Ω resistor, 20 μF capacitor and 0.2 H inductor all connected in series is fed by a voltage source of 220 ∠ 0 V. The system frequency is 50 Hz. Determine the complex power supplied by the source.

b) Find the average power supplied by the source (Figure 4). [5+5]

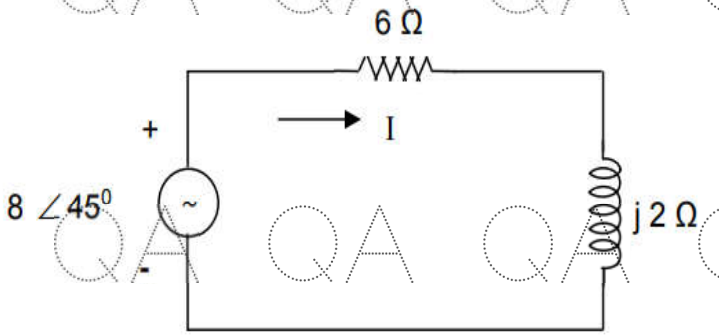

Figure 4

OR

5.a) Obtain the expression for resonant frequency of series R-L-C circuit excited by sinusoidal voltage source.

b) A balanced three-phase load connected in star consists of (6 + j 8) Ω impedance in each phase. It is connected to a three-phase supply of 400 V, 50 Hz. Find the magnitude of phase current and line current. [5+5]

6.a) Write the various types of transformers with necessary sketches.

b) Compare two winding transformers with auto transformer. [5+5]

OR

7.a) A 30 kVA, 2000/200 V, single phase, 50 Hz transformer has a primary resistance of 3.5 Ohm and reactance of 4.5 Ohm. The secondary resistance and reactance are 0.015 Ohm and 0.02 Ohm respectively, Find the total copper loss of the transformer.

b) Explain the operation of practical transformer with the necessary phasor diagram.[5+5]

8.a) The armature of a 6 pole DC generator has a wave winding containing 650 conductors, Calculate the generated emf when the flux per pole is 0.055 Wb and the speed is 300 rpm, calculate the speed at which the armature must be driven to generate an emf of 550 V if the flux per pole is reduced to 0.05 Wb.

b) Explain the construction and working of single-phase induction motor. [5+5]

OR

9.a) A long shunt d.c compound generator has an armature, series field and shunt field resistances are 0.04 Ohm, 0.03 Ohm, and 200 Ohm respectively. It supplies a load current of 180 A at 400 V, Calculate the generated emf Assume contact/brush drop = 1 V.

b) Explain the construction and working of three-phase induction motor. [5+5]

10.a) Explain various types of batteries.

b) Explain various types of wirings. [5+5]

OR

11.a) Explain the important characteristics of batteries.

b) Explain about the calculations of energy calculations. [5+5]

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