

Code No: 181AB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech I Year I Semester Examinations, January/February - 2025

BASIC ELECTRICAL ENGINEERING

(Common to CSE, IT, CSIT, CSE(CS), CSE(DS), CSD)

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)**

- When two resistors R_1 and R_2 are in series, What is the equivalent resistance? [1]
- State Norton's theorem. [1]
- Define the following: (i) amplitude (ii) phase difference of a sinusoidal quantity. [1]
- Distinguish between (i) active power and (ii) reactive power in A.C. circuits. [1]
- Why transformer is rated in KVA? [1]
- The maximum flux density in the core of a 250/3000-volts, 50-Hz single-phase transformer is 1.2 Wb/m^2 . If the e.m.f. per turn is 8 volt, determine primary and secondary turns. [1]
- Classify AC motors. [1]
- List out the advantages of three phase induction motor. [1]
- Define switchgear. [1]
- Define fuse and brief its importance. [1]

PART - B**(50 Marks)**

- Find the Thevenin's equivalent for the circuit shown figure 1 below.

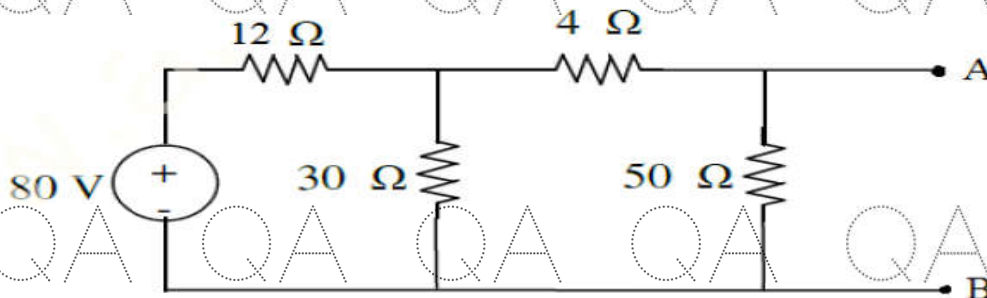


Figure 1

- Derive an expression for the voltage across the capacitor during charging through the resistor at any instant. Assume that RC series circuit is connected across a DC supply of voltage V . [5+5]

OR

- 3.a) Find the Norton's equivalent for the circuit shown Figure 2 below.

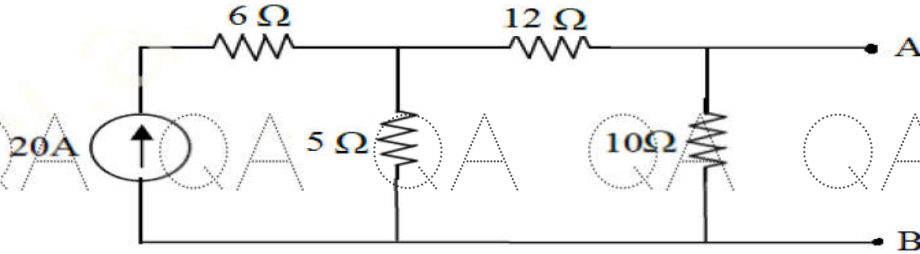


Figure 2

- b) Determine the current in branch A-B by using KVL(Figure 3). [5+5]

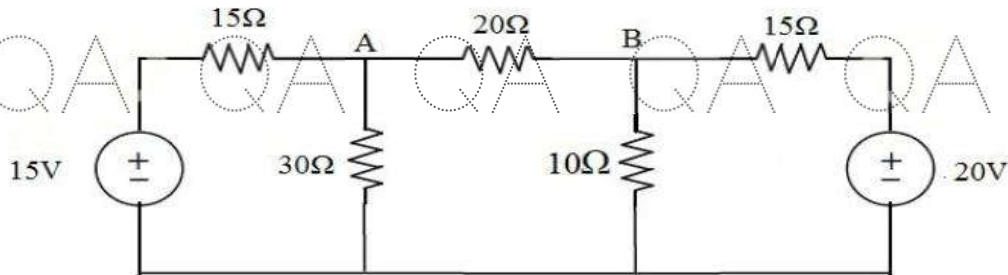


Figure 3

- 4.a) Prove that average power consumption in pure inductor is zero when a.c. voltage is applied.
 b) A 60 Hz sinusoidal voltage $v = 100 \sin \omega t$ is applied to a series R-L circuit. Assuming $R = 10 \Omega$, $L = 0.01 \text{ H}$, find the steady state current and relative phase angle. Also compute the effective magnitude and phase of voltage drops across each circuit elements. [5+5]

OR

- 5.a) Derive an expression for the instantaneous value of alternating sinusoidal e.m.f. in terms of its maximum value, angular frequency and time.
 b) A coil of 20Ω resistance has an inductance of 0.2 H and is connected in series with a $100\text{-}\mu\text{F}$ capacitor. Calculate the frequency at which the circuit will act as a non-inductive resistance of R ohms. Find also the value of R . [5+5]

- 6.a) A 25 kVA, single-phase transformer has 250 turns on the primary and 40 turns on the secondary winding. The primary is connected to 1500-volt, 50 Hz mains. Calculate
 i) Primary and Secondary currents on full-load,
 ii) Secondary e.m.f.
 iii) maximum flux in the core.
 b) Derive the emf equation of a transformer. [5+5]

OR

- 7.a) A single-phase transformer has 1000 turns on the primary and 200 turns on the secondary. The load current is 3 amp. at a p.f. of 0.2 lagging. Calculate the primary current and power-factor when the secondary current is 280 Amp at a p.f. of 0.80 lagging.
 b) For a three phase Delta-Delta, Star / Delta transformers draw the connection diagrams. [5+5]

- 8.a) Explain how the rotating magnetic field is produced in a three-phase induction motor.
 b) With neat and necessary diagrams, explain the construction of DC machine. [5+5]

OR

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- 9.a) Draw and explain the significance of torque-slip characteristics of three phase induction motor.
b) Explain the construction and working of single phase induction motor. [5+5]

QA QA QA QA QA QA QA G

- 10.a) With neat and necessary diagrams, explain the working principle of MCCB.
b) Explain different types of batteries. [5+5]

OR

- 11.a) With neat and necessary diagrams, explain the working principle of MCB.
b) What are the importance of earthing/grounding? Explain in brief. [5+5]

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