

R18

Code No: 151AG

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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

BASIC ELECTRICAL ENGINEERING

(Common to EEE, CSE, IT, CSIT, ITE, CE(SE), CSE(CS), CSE(DS), CSE(N), CSD)

Time: 3 Hours

Max. Marks: 75

Note: i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART - A

(25 Marks)

- 1.a) State Kirchoff's voltage law and current law. [2]
- b) Three resistances each of $R \Omega$ are connected to form a triangle. What is the resistance between any two terminals? [3]
- c) Explain the term form factor in connection with ac circuits. [2]
- d) Develop an expression for the power factor of a composite series circuit containing resistance $R \Omega$ and inductance L henry. Under what condition is it maximum? [3]
- e) Define regulation of a transformer. [2]
- f) Give the comparison table for single phase and three phase transformers. [3]
- g) Write the classifications of DC motors. [2]
- h) Draw the torque speed characteristics of three phase induction motor. [3]
- i) Give the types of batteries. [2]
- j) Draw and explain about neutral grounding. [3]

PART - B

(50 Marks)

- 2.a) Find the node voltages V_1 and V_2 in the circuit below(Figure 1):

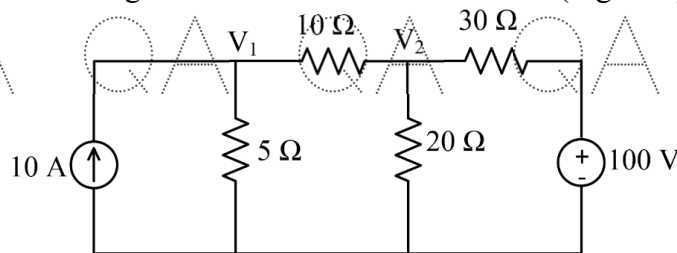


Figure 1

- b) State and explain superposition theorem. [6+4]

OR

- 3.a) Find the current through $2\ \Omega$ resistor of the network shown in Figure 2 using Thevenin's theorem.

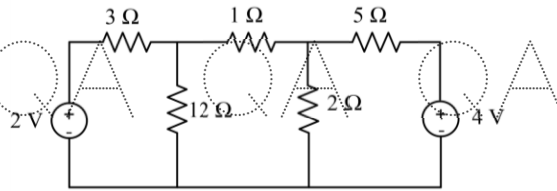


Figure 2

- b) A resistance of $10\ \Omega$ is connected across a supply of 200 V . If a resistance R is now connected in parallel with a $10\ \Omega$ resistance, the current drawn from the supply gets doubled. Find the value of unknown resistance R . [6+4]

- 4.a) Derive an expression for resonant frequency of R-L-C series circuit excited by sinusoidal voltage source.

- b) Explain about the ac series RC circuit with neat diagram and derive the voltage and current equation. Also, find the power factor angle and draw the voltage and current wave shapes of the circuit. [5+5]

OR

- 5.a) Find the capacitance which must be connected in series with a 100 W , 110 V lamp in order that the lamp may draw its normal current when the combination is connected to a 230V , 50 Hz supply.

- b) Derive the relationship between phase and line voltages in a balanced three phase star connected system. [5+5]

- 6.a) Give the equivalent circuit of transformer and find the equivalent resistance and reactance referred to primary and secondary.

- b) A single-phase transformer working at unity power factor has an efficiency of 90 percent at both one-half load and the full load of 2500 W . Determine the efficiency at 75 percent of full load. [4+6]

OR

- 7.a) Explain the construction and working principle of a single-phase transformer.

- b) A 25 KVA , $2200/220\text{ V}$, 50 Hz single phase transformer has the following resistances, $R_p = 0.8\ \Omega$; $X_p = 3.2\ \Omega$; $R_s = 0.009\ \Omega$; $X_s = 0.03\ \Omega$. Calculate the equivalent resistance and reactance referred to primary side. [6+4]

8. Explain the following starting methods for three phase induction motor:

- a) Auto transformer starting
b) Star- delta starting.

[5+5]

OR

- 9.a) Write a short note on speed control of separately excited dc motor.

- b) Draw and explain the construction and working of synchronous generator. [5+5]

10. Write a short note on types of:

- a) Cables
b) Wires

[5+5]

OR

- 11.a) With neat diagram, explain the principle of working of miniature circuit breaker.

- b) Give the important characteristics of batteries. [5+5]