

VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY (VSSUT), ODISHA
Even Mid Semester Examination for Academic Session 2024-25

COURSE NAME: **B. Tech**

SEMESTER: **2nd**

BRANCH NAME: **A, B, C, K, L, M, N**

SUBJECT NAME: **BASIC ELECTRICAL ENGINEERING**

FULL MARKS: **30**

TIME: **90 Minutes**

Answer **All** Questions.

The figures in the right-hand margin indicate Marks. *Symbols carry usual meaning.*

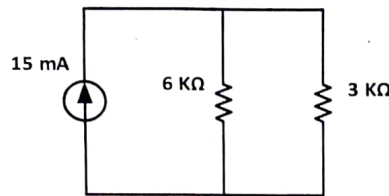
Q1. Answer all Questions.

[2 × 3]

- a) What do you mean by Active & Passive Elements. Give examples.
- b) Find the current through 6 K Ω resistor of the circuit shown in Fig.1.

- CO1

- CO2



- c) Define power factor quantitatively with proper expression. What should be the ideal value of power factor?

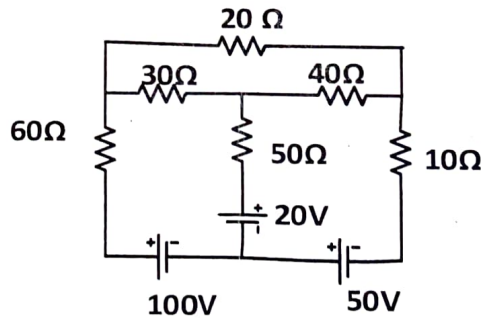
- CO3

Q2.

[4x2]

- a) Calculate the current in each branch of the circuit shown in Fig.2

- CO1



- b) Using Norton's Theorem find the current through 5 Ω resistor in the Fig. 3

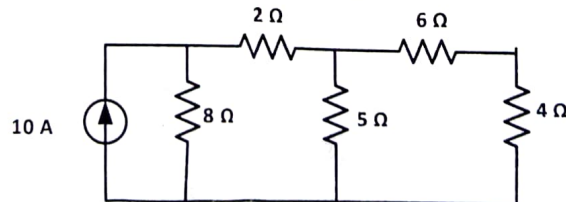


Fig. 3.

OR

- a) Using Superposition Theorem find the voltage across 4 Ω resistance in the Fig.4

- CO1

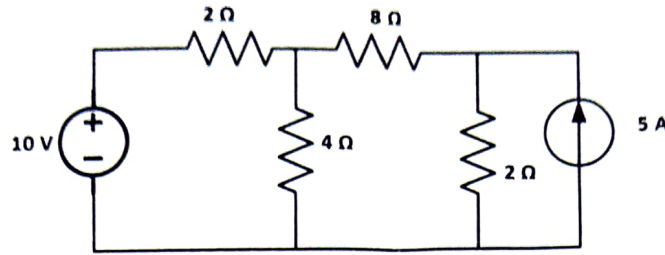


Fig.4

b) State & Explain Maximum Power Transfer Theorem.

Q3.

- a) For Fig. 3 find the current through the 5 Ohm resistor using Thevenin's Theorem.
- b) Derive the relation between line and phase voltage for a star connection with proper phasor diagram.

[4x2]
- CO2

OR

- a) With diagram explain the phenomenon of series RLC resonance and derive the expression of resonant frequency. Draw the graph showing the variation of impedance (Z), resistance (R), capacitive and inductive reactance (X_L and X_C) with frequency.
- b) Derive the expression for RMS and Average value of a sinusoidal AC signal having the expression of:

- CO2

$$v = V_m \sin(\omega t)$$

Also derive the value for Form and Peak factor with expression.

Q4.

- a) What are the different methods of power measurements in 3-phase circuits? With neat diagram derive the expression of 3-phase power for 2-wattmeter method.
- b) A 120 V, 20Hz source is connected to a series circuit consisting a capacitor of value $100\mu\text{F}$, a resistor of value 5 Ohm and a coil of resistance 1 Ohm and inductance 1mH. Calculate the input impedance, power factor and current in polar form taking voltage as reference. Also draw the phasor diagram for voltage and current.

[4x2]
- CO3

OR

- a) A balanced delta-connected load of $(8+j6)$ ohm per phase is connected to a balanced 3-phase 400V supply. Find the line current, power factor, active power and complex power.
- b) Do a comparative analysis between AC and DC circuits stating at-least 4 differences.

- CO3