M 072/040

Enrolment Number										

Total No. of printed pages = 04

Monsoon, 2023
B.Tech Semester Examinations
Basic Electrical Engineering
Course Code: BEL23101T

Full Marks –50   **Time –2 hours**

The figure in the margin indicates full marks for the questions.

Part A
Answer ALL questions
Multiple Choice (10 x 1 mark = 10 marks)

1. a) Which of the following elements is unilateral
    (i) diode   (ii) resistor
    (iii) conductor   (iv) inductor

    b) Circuit elements containing internal energy sources are called
    (i) active elements   (ii) passive elements (iii) unilateral elements (iv) bilateral elements

    c) In applying Thevenin's theorem independent active sources are eliminated by making the
    (i) voltage sources open circuited and current sources short circuited
    (ii) current sources open circuited and voltage sources short circuited
    (iii) both the sources open circuited
    (iv) both the sources short circuited

    d) Series combination of an ideal voltage source and current source behaves like
    (i) a voltage source (ii) a current source (iii) neither voltage nor current source (iv) either voltage or current source

    e) Negative power of a two terminal network implies that the element is
    (i) receiving energy   (ii) supplying energy
    (iii) neither receiving nor supplying energy   (iv) either receiving or supplying energy

    f) Maximum emf is generated in a rectangular coil rotating in a uniform magnetic field when the plane of the coil is
    (i) horizontal and parallel to the line of flux   (ii) horizontal and perpendicular to the line of flux
    (iii) vertical and parallel to the line of flux   (iv) vertical and perpendicular to the line of flux

    g) Form factor is defined as the ratio of

(i) maximum value to rms value

(ii) rms value to average value

(iii) maximumvalue to average value

(iv) rms value to maximum value

h)Susceptance is the

(i) realpart of admittance

(ii) imaginary part of admittance

(iii) real part of conductance

(iv) imaginary part of conductance

i) In a star connected balanced three phase system the phase difference between the line and phase voltages is

(i) 90° (ii) 30° (iii) 60° (iv)120°

j) Deflecting torque is produced by

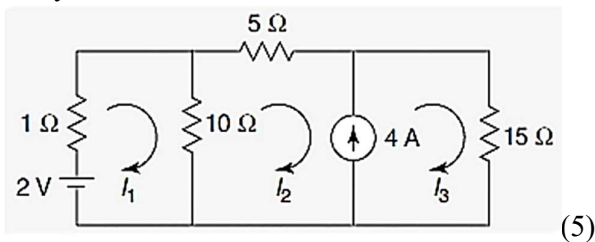(i) magnetic effect (ii) damping effect (iii) thermal effect (iv) electrostatic effect

Part B

Answer ANY FOUR questions
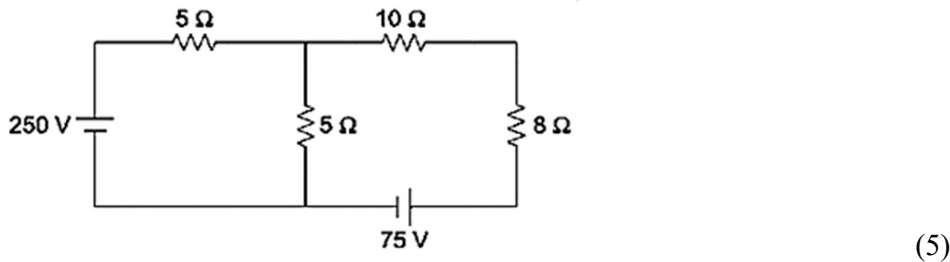
(4 x 5mark = 20 marks) (Max.100 words each question)

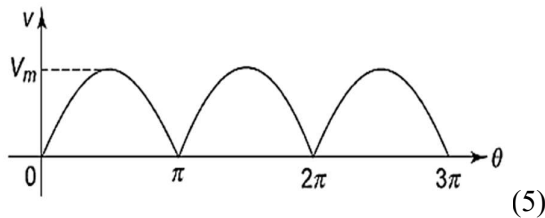2.Find the potential difference between the points x and y in the following network

(5)
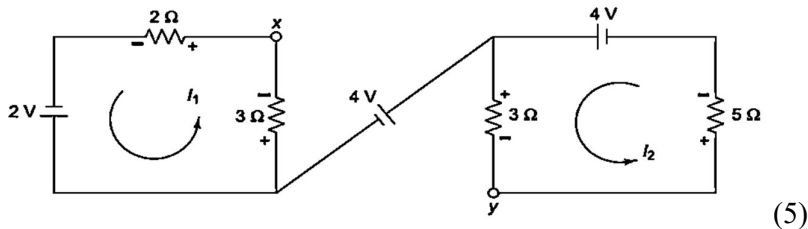
3.Find the current through the 10 Ω resistor of the networkshown in the following figure using mesh analysis

(5)

4.Find the value of current flowing through 8 Ohm resistor using Thevenins Theorem

(5)

5. Find the rms value of the following waveform

2

(5)

6.Explain the construction and working principle of a PMMC type instrument   .   (5)

7.Deduce the relationship between the line and phase values of voltages in a 3 phase star connected system.   (5)

Part C
Answer ANY TWO questions
(2 x 10mark = 20 marks) (Max.200 words each question)

8. a)In a circuit four currents are indicated as follows.

$i_1 = 5 \sin \omega t \quad i_2 = 10 \sin(\omega t - 30°) \, i_3 = 5 \cos(\omega t - 30°) \quad i_4 = -10 \sin(\omega t + 45°)$

These currents are meeting at a point in the circuit. Find the resultant current.   (3)

b) Three equal impedances, each of $(8-j6)\Omega$, are connected in delta. This is further connected to a 230V, 50 Hz, three phase supply. Calculate (a) power factor (b) line current and (c) reactive power. (3)

c) Prepare a comparison table between 3 phase star and delta connected systems. (4)

9. a)Determine the equivalent impedance, total current drawn, power factor and power consumed by the following circuit. (Supply Voltage is 100V, 50 Hz)
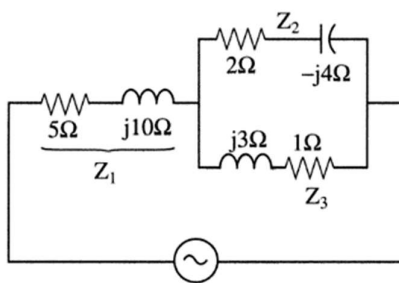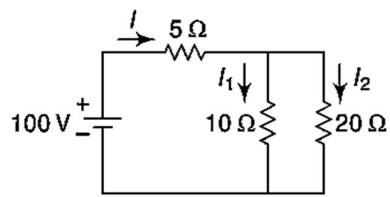

(6)

b)An alternating current is given by i = 14.14 sin 377 t.
Find (i) rms value of the current, (ii) frequency, (iii)instantaneous value of the current when t = 3 ms, and (iv) time taken by the current to reach 10 A for first time after passing through zero.   (4)

10. a)State and prove maximum power transfer theorem   (2+5)
    b)Find the supply current I and the currents I_1 and I_2 in the parallel branches

3

(3)

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