

MUKESH PATEL SCHOOL OF TECHNOLOGY MANAGEMENT & ENGINEERING

Programme: B. Tech (All Streams)

Year: I

Semester: I

Academic Year: 2019-20

Subject: Basic Electrical Engineering

Marks: 100

Date: 11 November 2019

Time: 10.00 am - 1.00 pm

Duration: 3 (hrs)

Final Examination (2019-20)/ Re-Examination (2018-19)Instructions:

1. **Question No. 1** is compulsory.
2. Out of remaining questions, attempt **any four** questions.
3. In all **five** questions to be attempted.

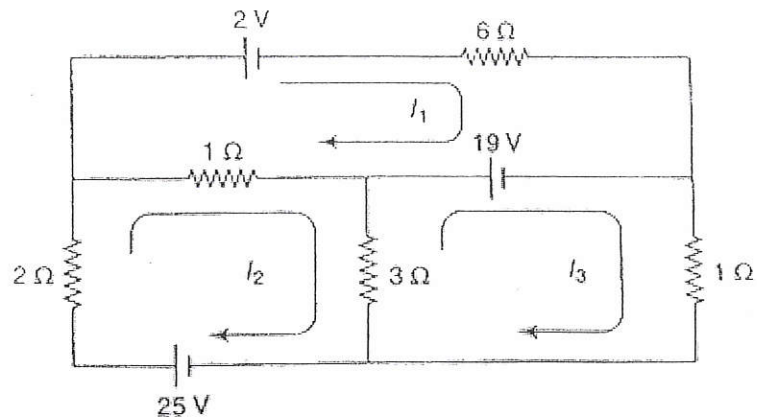
COMPULSORY

Attempt any five questions

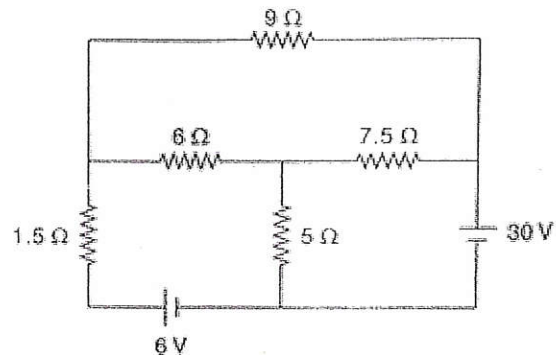
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| 1 a | State and explain Thevenin's theorem. | 4 |
| 1 b | State and Explain Kirchhoff's Voltage and current law. | 4 |
| 1 c | An alternating voltage $v(t) = 25 \sin(200t)$. Find V_{rms} , V_{avg} , time period, frequency, form factor, and crest factor. | 4 |
| 1 d | Elaborate the characteristics of an ideal transformer. | 4 |
| 1 e | Explain the significance of back EMF in DC motor. | 4 |
| 1 f | State any two applications each of choppers and inverters. | 4 |
| 1 g | Explain the need of earthing in a electrical installation and explain how earthing is done. | 4 |

OPTIONAL

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| 2 a | By mesh analysis, find mesh currents I_1 , I_2 , and I_3 in the network. | 10 |
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2 b Determine the current through 1.5Ω resistor in the network shown in Fig. by Thevenin's theorem. 10



3 a In a series R - L circuit; obtain the vector diagram, and derive an expression for impedance, phase angle, and power. Comment if the power factor is leading or lagging. 10

drops in the windings are to be ignored.

a Draw and explain the construction and working of single phase Induction Motor 10

b Describe the constructional details of a three phase induction motors. 10

a State the Superposition theorem and explain it with a suitable example. 10

b Draw the circuit diagram and waveforms of a DC-DC step down (buck) chopper and explain its working. 10

a A circuit is composed of a resistance of 8Ω , and a capacitive reactance of 6Ω in series. A voltage, $v = 141.4 \sin(314t)$ is applied to the circuit; a) Determine the impedance and draw the impedance triangle, b) Determine the rms, and instantaneous current, c) Calculate the power delivered to the circuit, d) Find the equation for the voltage appearing across the capacitor, and e) Determine the value of capacitance. 10

b What is the purpose of using a circuit breaker in an electrical installation? Explain the different circuit breakers (MCB, ELCB, MCCB) 10

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