

Indian Maritime University
(A Central University, Govt of India)
End Semester Examinations – December 2023
Programme Name: B Tech (ME)
Semester: II
Subject Code: UG11T4202
Subject Name: Basic Electrical Engineering

Date: 14.11.2023

Max Marks: 70

Duration: 03 Hrs

Pass Marks: 35

General Instructions

- (i) All Sections (A, B & C) are to be attempted.
- (ii) Options, if any, are specified in respective section.

Section A

Ten MCQs/Fill in the Blanks of 01 Mark each – Choose the correct answer as applicable.

1. It is necessary to find _____ of current to solve the circuit according to Kirchhoff's Laws.
 - a. Value
 - b. Direction
 - c. Symbol
 - d. Speed
2. The specific resistance or resistivity of a material is expressed in _____.
 - a. ohm
 - b. mho
 - c. ohm-m
 - d. mho/m
3. Form Factor is the ratio of
 - a. Average value to r.m.s. value
 - b. Average value to peak value
 - c. r.m.s. value to average value
 - d. r.m.s. value to peak value
4. For a given line voltage, four heating coils will produce maximum heat when connected
 - a. all in parallel
 - b. all in series
 - c. with two parallel pairs in series
 - d. one pair in parallel with the other two in series

5. An inductive coil has an impedance of 13 ohms with a resistance of 5 ohms. The Inductive resistance of the coil is _____.
- 1 ohm
 - 12 ohms
 - 6.4 ohms
 - 9 ohms
6. Digital multimeter is used for measurement of
- AC and DC Voltage
 - AC and DC Current
 - Resistance and continuity
 - All of these
7. What is impedance at resonance?
- maximum
 - minimum
 - zero
 - cannot be determined
8. A current of 10 A flows through a resistor and the power dissipated by the resistor is 100 watts. The potential difference across the resistor is _____.
- 1000 V
 - 10V
 - 1V
 - 100V
9. Two heaters, rated at 1000 W, 250 volts each, are connected in series across 250 Volts 50 Hz AC mains. Total power drawn from the supply would be ____ W.
- 1000
 - 500
 - 250
 - 2000
10. In a series parallel circuit, any two resistances in the same current path must be _____ in
- Parallel with each other
 - Parallel with the voltage source
 - Series with the voltage source
 - Series with each other

Section B

Five Questions of 02 Marks each

11. Distinguish between a Loop & Mesh of a circuit.
12. Sketch neatly B – H curve for a coil.

13. Determine the energy stored in an inductor of inductance 100mH when a current of 0.2A is passed through it.

14. What is the value of average value of power across the inductor.

15. Three resistors $2\ \Omega$, $4\ \Omega$, and $6\ \Omega$ are connected in series. If the applied voltage across this combination is 36 V, find the voltage drop across each resistor

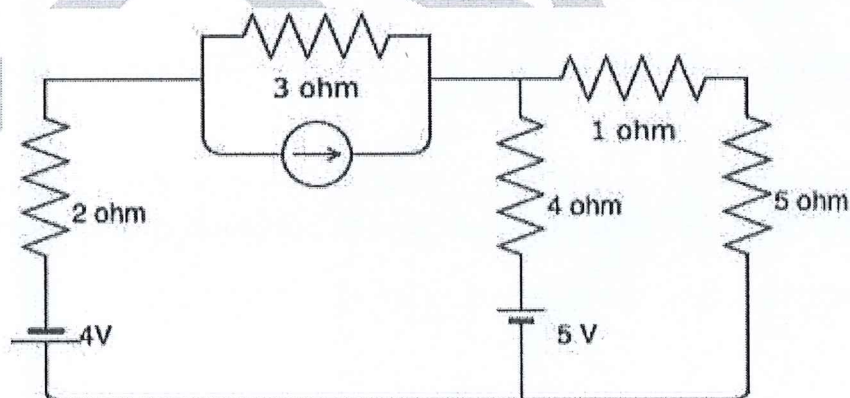
Section C

7 Questions of 10 Marks each of which any 05 questions to be answered.

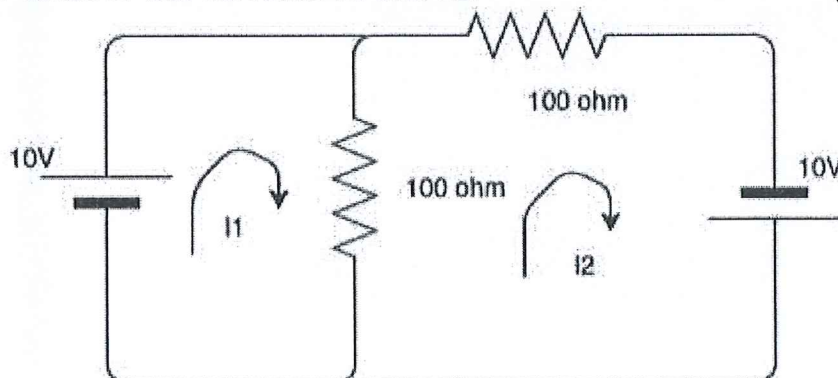
16. (a) (i) Explain Faraday's law of Electromagnetic Induction
 ii) Explain Lenz's Law [3+3 marks]

(b) Deduce the expression $e = Blv$, (where B is the magnetic flux density in Wb/m^2 , l is the effective length of the conductor in m, and v is the linear velocity in m/sec) when the conductor is moving at right angles to the stationary magnetic field, from basic principles of electromagnetic induction. (4 marks)

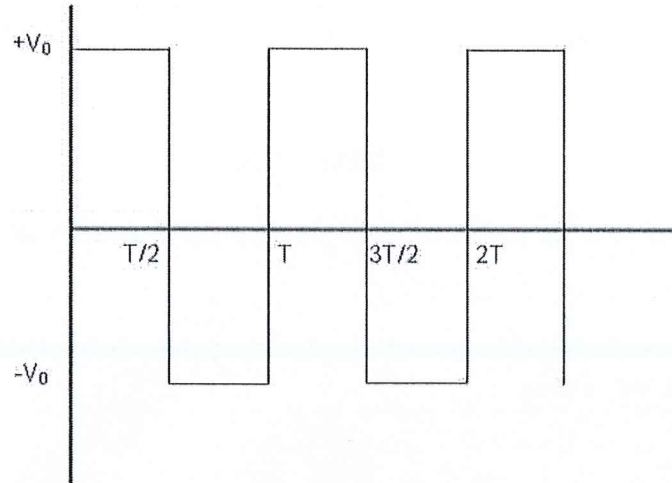
17. What is the voltage across the 5 ohm resistor if current source has current of $17/3\ \text{A}$? (10 Marks)



18. Find the value of the currents I_1 and I_2 . (10 Marks)



19. Calculate the average and RMS value of voltage for square waves shown in the fig. having a peak value V_0 . (10 marks)



20. An inductive coil takes 10 A and dissipates 1000 W, when connected to a supply at 250 V, 25 Hz. Calculate the impedance, the effective resistance, the reactance, the inductance and the power factor. (10 Marks)

21. (a) The coefficient of induction of a choke coil is 0.1H and resistance is 12Ω . If it is connected to an alternating current source of frequency 60Hz then what will be the value of power factor. (7 Marks)

- (b) Explain the characteristics of ideal voltage and current source. (3 Marks)

22. Discuss in detail the working and operating principle of hand driven megger with neat and clean diagram. Also mention the precautions before using it. (10 Marks)