Indian Maritime University

(A Central University, Govt of India)

Supplementary Examinations – September/October 2024

Programme Name: B Tech (ME)

Semester: II

Subject Code: UG11T4202

Subject Name: Basic Electrical Engineering

Date: 14.09.2024	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. _____ is used to describe the current.
   a. Coulomb b. Coulomb/sec
   c. A/m d. Joules/coulomb
2. The opposition offered by a material to the flow of current in a DC circuit is
   a. Resistance b. Reactance
   c. Admittance d. Impedance
3. Which of the following materials does not obey ohm's law?
   a. Copper b. Silver
   c. Platinum d. Gallium arsenide
4. An electric heater of rating 1000 W is used for 2 hours per day for 20 days. What is the electrical energy utilized?
   a. 20 kWh b. 2 kWh
   c. 60 kWh d. 40 kWh
5. The equation of an alternating voltage is given by v = 200 sin 314 t. The peak value of the voltage is _____ Volts.
   a. 200 b. 141.42
   c. 180.18 d. 222
6. The power-factor of a pure capacitive circuit will be _____.
   a. unity b. zero leading
   c. zero lagging d. 0.866 lagging
7. Digital multimeter is used for measurement of _____.
   a. AC and DC Voltage b. AC and DC Current
   c. Resistance and continuity d. All of these
8. Tesla is the unit of measurement of _____.
   a. Magnetic flux density b. Permeance
   c. Reluctance d. magnetic flux
9. 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
10. In Fleming's Right hand rule, the direction of induced e.m.f. is denoted by
   a. thumb
   b. fore finger
   c. middle finger
   d. little finger

Section B

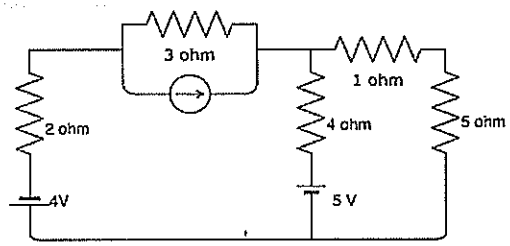
Five Questions of 02 Marks each

11. Distinguish between a Loop & Mesh of a circuit.
12. Three resistors 2 Ω, 4 Ω, and 6 Ω are connected in series. If the applied voltage across this combination is 36 V, find the voltage drop across each resistor.
13. Define the term "Mutual Inductance" between two coils.
14. Sketch neatly B – H curve for a coil.
15. Determine the energy stored in an inductor of inductance 100mH when a current of 0.2A is passed through it.

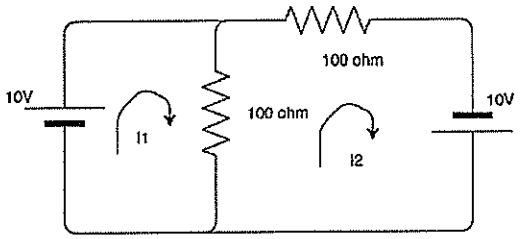
Section C

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

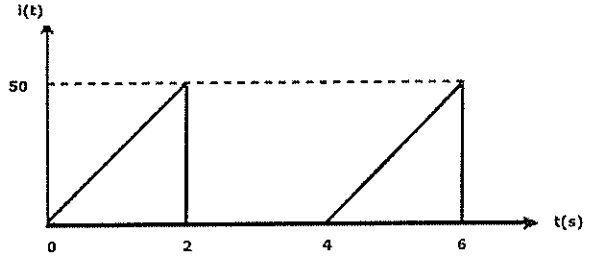
16. What is the voltage across the 5 ohm resistor if current source has current of 17/3 A? (10 marks)



17. Find the value of the currents I1 and I2. (10 Marks)



18. The current i (t) in a pure resistor of 10 Ω is shown in the figure. Find the power dissipated in the resistor. Also find the peak factor for the given waveform. (10 Marks)



19. (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. (5 Marks)

(b) Explain the characteristics of ideal voltage and current source. (5 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) 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. (6 marks)

(b) State Faraday's law of electromagnetic induction & Lenz's law. (4 marks)

22. Explain the construction and operation of an insulation tester. (10 marks)