Indian Maritime University

(A Central University, Govt of India)

End Semester Examinations – June 2024

Programme Name: B Sc (NS)

Semester: II

Subject Code: UG21T5202

Subject Name: APPLIED PHYSICS & ELECTRICITY

Date: 30.05.2024	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. The fraction of magnetic flux produced by the current in one coil that links the other is known as
   A) Self-inductance
   B) Mutual inductance
   C) Coupling Coefficient
   D) Quality factor

2. Lenz's law is a consequence of the law of conservation of
   A) Energy
   B) Mass
   C) Charge
   D) Momentum

3. The impedance of the series RLC circuit at resonance is equal to
   A) 0
   B) R
   C) X_L
   D) X_C

4. The total capacitance of two capacitors C_1 and C_2, connected in parallel, is
   A) $C_1.C_2$
   B) C_1+C_2

C) $C_1C_2/(C_1+C_2)$
D) $(C_1+C_2)/C_1C_2$

5. Wheatstone bridge works on the principle of
   A) Electromagnetic induction
   B) Static electricity
   C) Null deflection
   D) Resonance

6. The algebraic sum of voltages around the closed loop is stated by
   A) Ampere's law
   B) Kirchhoff's law
   C) Lorentz's law
   D) Ohm's Law

7. The direction of induced e.m.f. can be found by
   A) Laplace's law
   B) Lenz's law
   C) Fleming's right hand rule
   D) All of the above

8. The closeness of two or more measurements is called
   A) Accuracy
   B) Precision
   C) Threshold
   D) Fidelity

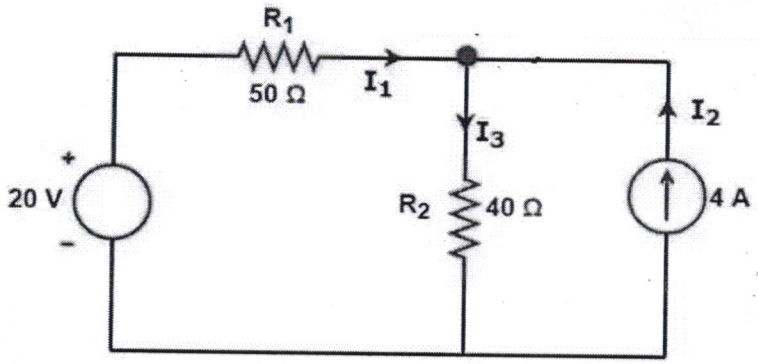
9. Thermistor has the property of
   A) Positive temperature coefficient
   B) Negative temperature coefficient
   C) Zero temperature coefficient
   D) Infinite temperature coefficient

10. Venturimeter works on the principle of
   A) Archimedes principle
   B) Pascal's law
   C) Bernoulli's theorem
   D) Hook's law

Section B

Five Questions of 02 Marks each

11. Define mutual inductance.
12. Define power factor.
13. Define active and passive elements.
14. Define RMS value of Alternating Current.
15. Define transducer.



20. a) With a neat sketch, explain the working of AC generator. (5 marks)
b) Distinguish between DC series and DC shunt motor. (5 marks)

21. a) An electric heater of resistance 10 Ω connected to 220 V power supply is immersed in the water for 10 minutes. Compute the heat energy produced by it? (5 marks)

b) Distinguish between motor and generator. (5 marks)

22. a) What is thermocouple? Explain how it is used as temperature sensor? (5 marks)

b) Explain the working of Venturimeter with neat diagram. (5 marks)

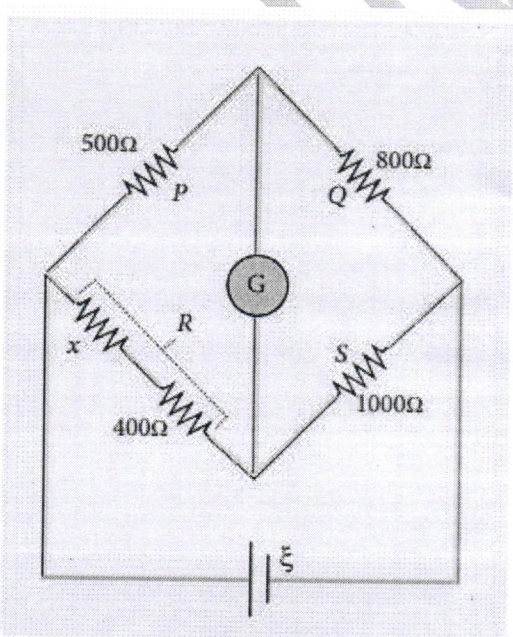
Section C

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

16. a) State and Explain Faraday's Law of Electromagnetic induction. (5 marks)
b) Compute the mutual inductance between two coils when a current of 4A changing to 8A in 0.5 second in one coil, induces an emf of 50 mV in the other coil. (5 marks)

17. a) Define static electricity. State it's any two hazards and any two precautions. (5 marks)
b) An RLC series circuit consists of a resistance of 1KΩ, an inductance of 100mH an a capacitance of 10pF. If a voltage of 100V is applied across the combination, compute the resonant frequency and Q-factor of the circuit. (5 marks)

18. a) Derive the balance condition of Wheatstone bridge. (5 marks)
b) Compute the value of x when the given Wheatstone's network is balanced. (5 marks)



19. a) Explain Kirchhoff's laws with necessary diagrams. (5 marks)
b) Compute the current I_3 in the given circuit using Kirchhoff's current law. (5 marks)