

INDIAN MARITIME UNIVERSITY
(A Central University, Government of India)
End semester examination – June 2022
B. Sc.(Nautical Sciences)
SEMESTER – II
Applied Physics and Electricity
(UG21T5202)

Date: 21.06.2022

Maximum marks: 70

Time: 3 hours

Pass Marks: 35

Part A (Question 1 is compulsory)

(10 x 1 = 10 marks)

Q.1. i) Lenz's law is a consequence of the law of conservation of

- A. Charge
- B. mass
- C. Energy
- D. Momentum

ii) The selectivity of a circuit is defined as the ratio of

- A. Bandwidth to resonant frequency
- B. resonant frequency to bandwidth
- C. Reactance to resistance
- D. Resistance to reactance

iii) The dynamically induced emf in a conductor does not depend on

- A. Flux density
- B. its active length
- C. its conductivity
- D. its velocity

iv) The field coils of DC generator are usually made of

- A) Mica
- B) Copper
- C) cast iron
- D) Carbon

v) Kirchhoff's voltage law is concerned with

- A. IR drops
- B. battery emfs
- C. junction voltages
- D. both (a) and (b)

vi) The closeness of two or more measurements is called

- A. precision
- B. Accuracy
- C. Fidelity
- D. threshold

vii) The instrument used for measuring the rate of flow of fluid is called

venturimeter which works on the principle of

- A. Pascal's Law B. Archimedes principle C. Bernoulli's theorem
D. Hook's law

viii) If the voltage-current characteristics is a straight line through the origin, then the element is said to be?

- A. Linear element B. Non-linear element C. Unilateral element
D. Bilateral element

ix) If the resistances 1Ω , 2Ω , 3Ω , 4Ω are connected in parallel, then the equivalent resistance is

- A. 0.46Ω B. 0.48Ω C. 0.5Ω D. 0.52Ω

x) The direction of rotation of motor is determined by

- A. Faraday's law B. Lenz's law C. Coulomb's law D. Fleming's left hand rule

Part B (Question 2 is compulsory)

(5 x 2 = 10 marks)

Q.2 i) Define RMS Value of current.

ii) State Lenz law.

iii) State the heating effect of current.

iv) State and explain Kirchhoff's current law with an example.

v) Define coupling coefficient and give its formula.

Part C (Attempt any 5 questions out of 7)

(5 x 10 = 50 marks)

Q.3 a) Define induced emf and induced current . (3 marks)

(5 marks)

b) A flux of 0.5 mWb is produced by a coil of 900 turns wound on a ring with a current of 3 A in it. Calculate i) the inductance of the coil, ii) the emf induced in the coil when a current of 5A is switched off, assuming the current to fall to zero in 1 millisecond. iii) energy stored in an inductor. (7 marks)

Q.4 a) Define static electricity. State it's any two hazards and any two precautions. (5 marks)

b) An R-L-C series circuit consists of a resistance of 1000Ω , an inductance of 100mH and a capacitance of $10\mu\text{F}$. If a voltage of 100V is applied across the combination, find (i) The resonance frequency (ii) Q-factor of the circuit.

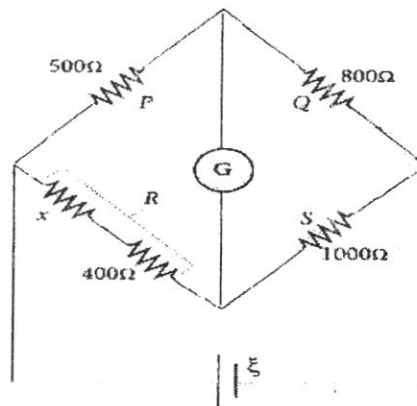
(5 marks)

Q.5 a) Derive the balance condition of Wheatstone bridge.

(5 marks)

b) What is the value of x when Wheatstone's network is balanced?

$$P = 500 \Omega, Q = 800 \Omega, R = x + 400, S = 1000 \Omega \quad (5)$$



Q.6 a) A coil of 2500 turns has a flux of 10 mWb linking with it when carrying a current of 2 A . Calculate the coil's inductance and the e.m.f.

induced in the coil when the current collapses to zero in 20 ms . (5 marks)

b) Define Resonant frequency and Q-factor of coil. (5 marks)

Q.7 a) Differentiate between AC and DC generator with diagram. (5 marks)

b) An 8 pole wave connected dc generator has 1000 armature conductors and flux per pole is 0.035 Wb . At what speed must it be driven to generate 500V ? (5 marks)

Q.8 Discuss the classification of DC motors with schematic diagram.

(10 marks)

Q.9 a) What is a thermistor? Discuss its application as a heat sensor with neat labelled diagram. (5 marks)

b) Define and explain accuracy and precision. State the difference between them. (5 marks)