

**Indian Maritime University**  
**(A Central University, Govt of India)**  
**Supplementary Examinations – March/April 2025**

**Programme Name: B Sc (NS)**

**Semester: I**

**Subject Code: UG21T6103**

**Subject Name: PHYSICS**

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Date: 05.03.2025

Max Marks: 70

Duration: 03 Hrs

Pass Marks: 35

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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. What determines whether an object will float or sink when placed in a fluid?
  - A) The shape of the object.
  - B) The density of the object relative to the density of the fluid.
  - C) The temperature of the fluid.
  - D) The colour of the object.
  
2. Which of the following is a key principle behind the operation of a gyroscope?
  - A) Conservation of energy
  - B) Conservation of angular momentum
  - C) Pascal's principle
  - D) Bernoulli's principle
  
3. What is the typical range of frequencies for audible sound in humans?
  - A) 1 Hz to 20 kHz
  - B) 20 Hz to 20 kHz
  - C) 20 Hz to 200 kHz
  - D) 100 Hz to 10 kHz

4. What is the primary function of a hatch cover on a ship?
- A) To provide ventilation
  - B) To prevent water ingress and protect the cargo
  - C) To enhance the ship's speed
  - D) To serve as a communication platform
5. The angle measured by a sextant is known as what?
- A) Altitude
  - B) Bearing
  - C) Angle of elevation
  - D) Arc
6. Which imaging technique uses X-rays to create cross-sectional images of the body?
- A) MRI
  - B) Ultrasound
  - C) CT scan
  - D) PET scan
7. What is the primary effect of mutual induction?
- A) Induction occurs in the same coil
  - B) A changing current in one coil induces EMF in another coil
  - C) Induction does not occur
  - D) It only occurs in transformers
8. What is the main factor that affects the amount of heat generated by an electric current in a conductor?
- A) The length of the conductor
  - B) The temperature of the conductor
  - C) The resistance of the conductor
  - D) The type of current (AC or DC)
9. What is a thermistor primarily used for?
- A) Measuring voltage
  - B) Measuring current
  - C) Temperature sensing and control
  - D) Storing electrical energy
10. In a Yagi-Uda antenna, what is the role of the reflector?

- A) To receive signals
- B) To enhance gain and directivity
- C) To match impedance
- D) To provide support structure

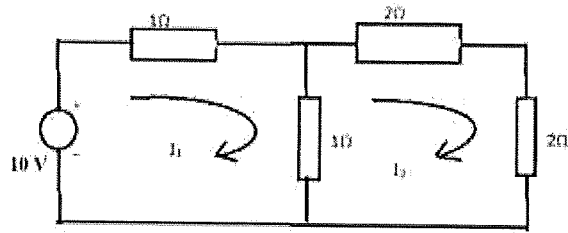
### **Section B**

Five Questions of 02 Marks each

11. State Bernoulli's Theorem.
12. How are frequency and pitch related in the context of sound waves?
13. What are radio waves, and what are their common applications?
14. What are some common examples of static electricity that people experience in daily life.
15. What is the primary function of an antenna in communication systems?

### **Section C (05 x 10 = 50 marks)**

16. a) Explain gyroinertia and gyroscopic motion with diagram. (6)  
 b) A rope is wound around a hollow cylinder of mass 3 kg and radius 40 cm. If the rope is pulled with a force of 30 N, find i) the angular acceleration of the cylinder and ii) the linear acceleration of the rope. (4)
17. a) What is buoyant force? State the laws of floatation. (5)  
 b) Water flows steadily through a horizontal pipe of a non-uniform cross-section. If the pressure of water is 0.05 m of Hg at the point, where the water is flowing with a velocity of 0.5m/s, what is the pressure at another point where the velocity of flow is 0.75m/s? (5)
18. State Doppler's effect and discuss the various cases of relative motion between the source and the listener. (10)
19. a) Differentiate between a heat engine and a refrigerator. (5)  
 b) Explain electromagnetic spectrum and discuss the various components in brief. (5)
20. a) What is total internal reflection? Explain looming with diagram. (6)  
 b) State Ohm's law and its limitations. (4)
21. a) Find the currents  $I_1$  and  $I_2$  in the given circuit by applying Kirchoff's voltage law. (5)



b) What is static electricity? State its hazards. (5)

22. a) Explain the working of a radio transmitter with a diagram. (4)

b) What is an antenna? Explain Yagi Uda antenna with the help of a neat labelled diagram. (6)

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