Indian Maritime University

(A Central University, Govt. of Ind4ia)

End Semester Examinations – December 2024

Programme Name: B Sc (NS)

Semester: I

Subject Code: UG21T6103

Subject Name: Physics

Date: 19.12.2024	Max Marks: 70
Duration: 03 Hrs	Pass Marks: 35

General Instructions

(i) All Sections (A, B & C) are to be attempted.

(ii) Attempt any five questions out of seven questions from section C.

(iii) Scientific non programmable calculators are allowed.

Section A (01 x 10 = 10 marks)

Choose the correct answer.

1. When is a fluid called turbulent?

A. Fluid of high viscosity

B. fluid with Reynold's number greater than 2000

C. fluid with Reynold's number less than 2000

D. density of the fluid is low

2. The moment of inertia of a spinning body about an axis doesn't depend on which of the following?

A. Distribution of mass around an axis

B. Orientation of mass

C. mass

D. angular velocity

3. What is Pascal's law?

A. For every action, there is an equal and opposite reaction.

B. Force is the time rate of change of momentum

C. For an ideal gas, the pressure is directly proportional to the temperature and constant volume and mass.

D. A pressure change at any point in the fluid such that the same change occurs everywhere.

4. An underwater sonar source operating at a frequency of 60KHz directs its beam towards the surface. If the velocity of sound in air is 330m/s, wavelength and frequency of the waves in air are

A. 5.5m, 60KHz B. 5.5m, 30KHz

C. 5.5m, 80KHz D. 2.5m, 30KHz

5. On a cold morning, a metal surface will feel colder to touch than a wooden surface, because

A. Metal has high specific heat B. Metal has high thermal conductivity

C. Metal has low specific heat D. Metal has low thermal conductivity

6. Sextant works on the phenomenon of

A. Refraction of light

B. Polarization of light

C. Reflection of light

D. Total internal reflection

7. An engine uses 30A of current. The resistance offered is 15Ω. Calculate the power consumed by the engine in horsepower.

A. 18 hp B. 19 hp C. 17hp D. 13500 hp

8. Which of the following is true about the inductors?

I. They store energy over a long time.

II. They can produce a magnetic field.

III. They resist the flow of current through it.

A. I B. III C. I and II D. II and III

9. A device that can both transmit and receive is called?

A. transreceiver B. transducer C. Duplexer D. Radar

10. What is the role of transmitter in the communication system?
    A. To decode a signal to be transmitted.
    B. To convert one form of energy into another.
    C. To detect and amplify information signal from the carrier.
    D. To produce the radio waves to transmit data.

Section B (02 x 05 = 10 marks)

11. State Bernoulli's theorem.
12. What do you understand by radius of gyration?
13. Define decibel.
14. Draw the block diagram of a radio receiver.
15. What is the amount of heat released in 10 s when a lamp of resistance 1000Ω is connected across a dc supply of 25V?

Section C

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

16. a) How does a spinning gyroscope resist change in its orientation. (7)

b) A solid sphere of mass 7 kg and radius 0.3 m, has a moment of inertia about its central axis given by $I=2/5\ MR^2$.calculate the radius of gyration of the solid sphere. (3)

17.a) Explain with neat block diagram, the application of reflection to the measurement of depth by echo sounder. (7)

b) A train is moving towards a stationary observer at a speed of 20 m/s. The frequency of the sound produced by the train whistle is 500 Hz. if the speed of sound in air is 340 m/s. calculate the frequency heard by the observer. (3)

18. a) How does a sextant measure angles between celestial objects and the horizon? (7)

b) A light ray travels from water(n1=1.33) into air (n2=1.00). calculate the critical angle for the total internal reflection at the water-air interface. (3)

19. a) How is a Periscope used in submarines. (7)

b) A refrigerator has a COP of 5 and removes 300 KJ of het from the cold reservoir. calculate the work input to the refrigerator. (3)

20. a) How does Pascal's law enable the operation of Hydraulic lift. (7)

b) A sound source produces a sound intensity of 1×10^{-4} W/m^2.calculate the sound intensity level in decibels. (3)

21. a) State Kirchoff current and voltage law and what fundamental principle does it represent. (7)

b)A light bulb draws 0.5 A of current ,when connected to a 120 V source. What is the resistance of the light bulb. (3)

22.a) How do Radar transmitters and receiver coordinate their operation in a Radar system. (7)

b) What are some applications of Thermistors in everyday devices and industrial applications. (3)