Sub.Code : 1021'A'

NEB - GRADE XII
2079 (2022)
Physics
Grade Increment (Supplementary) Examination

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Time: 3 hrs. **Full Marks: 75**

Attempt **all** the questions.

Group 'A' 11×1=11

Rewrite the correct options of each questions in your answer sheet.

1. When torque acting upon a system is zero, which of the following will be constant ?
   (A) Force (B) Linear momentum
   (C) Angular momentum (D) Impulse
2. The time period of a simple pendulum is
   (A) $T = 2\pi\sqrt{l/g}$ (B) $T = \frac{1}{4\pi}\sqrt{l/g}$
   (C) $T = 4\pi\sqrt{g/l}$ (D) $T = \frac{1}{2\pi}\sqrt{g/l}$
3. If a liquid does not wet the solid surface, the angle of contact is
   (A) Less then 90^0 (B) 90^0 (C) greater than 90^0 (D) 0^0
4. A gas is initially at 27° C. It is compressed adiabatically from 27 litres to 8 litres. The rise in temperature is
   (A) 402° C (B) 375° C (C) 675° C (D) 537° C
5. The efficiency of a carnot engine working between steam point and ice point is about.
   (A) 56.8% (B) 44.8% (C) 26.8% (D) 14.8%
6. When sound wave is refracted from air to water, which of the following will remain unchanged ?
   (A) frequency (B) wave length (C) wave velocity (D) wave number
7. In Young's double slits experiment, the distance between the slits is halved and distance between slits and screen is doubled. Then, fringe width becomes.
   (A) Half (B) Double (C) Four times (D) Six times

Contd...

8. Area of hysteresis curve indicates
   (A) Retentivity (B) Coercivity
   (C) Loss of energy per cycle (D) Gain of energy per cycle
9. A straight conducting rod of length 0.4m is moving perpendicular to magnetic flux density of 0.9Wb/m^2 with a speed of 7m/s. The emf developed in the rod is .
   (A) 25.4V (B) 2.52V (C) 5.24V (D) 1.84V
10. An X-ray tube operated at 50 kV produces heat at the target at the rate of 740 watt. If 0.5% energy of incident electron is converted into X-rays, then the number of electrons striking the target per second will be.
    (A) 1.1×10^{17} (B) 1.1×10^{19} (C) 1.1×10^{18} (D) 1.1×10^{-16}
11. The point where the seismic waves start is called.
    (A) epicenter (B) metacenter (C) seismic centre (D)hypocenter

Group 'B' 8x5=40

12. a) State Bernoulli's principle. 1
    b) Derive Bernoulli's equation. 3
    c) A man standing on the platform near the railway line be sucked in by a fast moving train, why ? 1
13. a) State the principle of conservation of angular momentum. 2
    b) Aballet dancer spins with 2.4 rev/s with her arms outstretched when the moment of inertia about the axis of rotation is I. With her arms folded, the moment of inertia about the same axis becomes 0.6I. Calculate the new rate of spin. 3

    OR

    a) What is simple harmonic motion ? Derive an expression for time period in angular simple harmonic motion. 3
    b) A particle of mass 0.25 Kg oscillates with a period of 2sec. If its greatest displacement is 0.4m, what is its maximum kinetic energy ? 2
14. a) What is an isothermal process ? 1
    b) Derive an expression for the work done during isothermal process. 3
    c) Can work be done by the system without changing its volume ? 1
15. a) Discuss the effect of temperature and density of elastic medium on velocity of sound. 2
    b) What are the assumptions of Newton and Laplace on deriving the formula for velocity of sound in gas ? Explain. 3

    OR

Contd...

a) What is Doppler's effect ? 1

b) Deduce the formula for the apparent frequency of sound wave when the source is moving towards the stationary listener. 2

c) A car travelling at 20 ms^{-1} sounds its horn which has a frequency of 600Hz. What frequency is heard by a stationary distant observer as the car approaches ? Velocity of sound =340m/s. 2

16. a) State Kirchhoff's laws of electrical circuits. 2

b) Using these laws, derive the condition for balance of a Wheatstone bridge circuit. 3

17. a) Derive force exerted per unit length between two long parallel current carrying conductors. 3

b) Define one Ampere in terms of force. 2

18. a) State Bohr's postulates of atomic model. 2

b) If the shortest wavelength in the Lyman series is 918 $\overset{o}{A}$, Calculate the longest wavelength in the same series. 3

19. a) Explain the working of full wave referrer. 3

b) What types of seismic waves are formed during great earthquake ? Explain. 2

Group 'C' 8x3=24

20. a) State Hugyen's principle. 1

b) Explain diffraction pattern due to a single slit and derive condition for secondary maxima and minima. 4

c) Give two differences between fringes formed in single slit diffraction and youngls double slits experiment. 2

d) Calculate the polarizing angle for light travelling from water of refractive index 1.33 to glass of refractive index 1.53. 1

21. a) What do you mean by impedance of ac circuit ? 1

b) Obtain an expression for impedance of LCR series circuit. 2

c) What is resenance in LCR series circuit ? Obtain resonance frequency. 2

d) A series LCR circuit is connected to an ac power supply with 120V, 60Hz. If R=50Ω, C=8μF and L=0.3H, what is the average power discipated ? 3

OR

a) State Ampere's law. 2

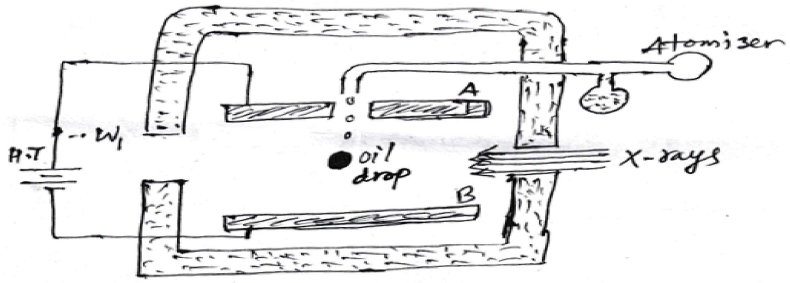
b) Use this law to calculate the magnetic field at a point on the axis of a current carrying long solenoid. 3

c) What is self inductance ? 1

Contd...

d) Derive an expression for self inductance of the solenoid. 2

22. Figure represents the experimental arrangement for Millikan's oil drop experiment.



a) For what purpose did Millikan use this apparatus ? 1

b) Why atomizer & x-ray are used ? 1

c) Why water drops can not be used instead of oil ? 1

d) What would be the effect on Millikan's oil drop experiment, of performing it in a vacuum ? 1

e) An oil drop of mass 4.95×10^{-15} kg is balanced between two horizontal plates with upper plate positive, the electric field strength between plates is E= 5.1×10^{4} N/C.

i) Under what condition do the oil drops between plates remain suspended in air ? 1

ii) What is the change on the oil drop? 1

iii) What is quantization of change ? 1

iv) Explain what the same charged oil drop would do if the plates were brought closer together, keeping the same charge on the oil drop and voltage across the plates. 1

OR

a) State disintegration laws of radioactive decay. 2

b) Obtain $N = N_0 e^{-\lambda t}$, were symbol have usual meanings. 3

c) The isotope Ra-226 undergoes decay with a half life of 1620 years. What is the activity of 1 gram of Ra- 226 ?
(Avogadro number = 6.023×10^{23}/mol) 3

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