NEB – GRADE 12

2081 (2024)

Physics(New Course)
(For the regular and grade increment general stream students whose first two digits of registration number starts from 78,79 and 80)

Attempt all the questions.

Group A

Rewrite the correct options of each questions in your answer sheet. [11*1=11]

1 If the meniscus of a liquid kept in a glass tube is plane then what will be the value of angle of contact?

(A) Zero (B)less than 90 degree (C) greater than 90 degree (D)equal to 90 degree

2 The period of oscillation of mass M suspended from a spring is 2 second.What will be the period if mass is equal to 4M?

(A) 1 sec (B) 2 sec (C) 4 sec (D) 8 sec

3 A disc of moment of inertia 1 is rotataing about an axis passing through its centre and perpendicular to its plane.if a

small wax of mass m is dropped at distance r from the axis of rotation then what will be the new moment inertia of the disc?

(A) I (B) I-mr^2 (C) I+mr^2 (D) I/mr^2

4 An ideal heat engine working between temperatures T1 and T2 has efficiency η .if both the temperature are raised by 50K each, the new efficiency of engine will be

(A) η   (B)more than η   (C) less than η

(D) depends upon the nature of working substance

5 . An ideal gas is taken through series of changes represented in diagram.The workdone by the gas at the end of cycle is
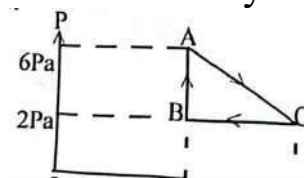
(A)6*10^{-6}J   B 12*10^{-6}J

(C)3*10^{-6}J   D 6J

6 . In which of the following medium ,the velocity of sound is highest?

A Vacuum B Water   C Hydrogen D Steel

7. Critical angle for a glass is 42 degree.What will be the Polarizing angle for it?

A 30^0 B 45^0 C 56^0 D 65^0

8. Study the following list of thermoelectric series ans answer the question given below.

Sb,   Fe, Zn, Pb, Mn, Cu, Bi

Which the following combination would give the least emf?

(A) Sb and Bi (B)Fe and Cu (C) Sb and Cu

(D) Zn and Mn

9 Which of the followings can be explained by the area of the hysteresis curve ?

(A) Retentivity B loss of energy per cycle

C coercivity   D Curies temperature

10 A charge of 2 coulomb is moving with velocity of 0.5 ms^{-1} at an angle of 30^0 in an magnetic field of 4T.What will be the magnetic force experienced by the charge ?

A 1N B 2N C 4N D 0.5N

11 Which of the earthquakes wave is first recoreded on the sesimograph?

A S-waves   B P-waves

C Love waves   D Rayleigh waves

Group B

Short answer Questions.   **8*5=40**

12. a) Define moment of inertia   [1]
    b) State principle of conservation of angular momentum
       with one example   [1+1]
    c)A wheel starts from rest and accelerates with constant
     Angular acceleration to an angular velocity of 8
      revolutions per 5 seconds.Calculate :
    i) Angular acceleration and
    ii) Angle which the wheel has rotated at the end of 3 sec.
    [2]

<div align="center">OR</div>

    a) Define simple harmonic motion   [1]
    b) Obtain an expression for frequency of oscillation of
       vertical mass spring system[2]
    c) A simple pendulum of effective length 4 m swings
with an amplitude of 0.2m.Compute the velocity of pendulum at
its lowest point [g=9.8ms^{-2}]

13. a) Define capillarity with two suitable examples [2]
   b) Water flows steadily through a horizontal pipe of non-
      uniform cross-section.if the pressure of water is $4*10^4$
      Nm^{-2} at a point where the velocity of the flow is 2ms^{-1}
      cross section is 0.002ms$^{2.}$what is the pressure at a point
      where cross-section reduces to 0.01m^2?[2]

14 a)Adiabatic process is the thermodynamic process in which
   the heat contained in a gaseous system remains constant

i) Adiabatic curve is much steeper than an isothermal curve,why?

ii) Derive an expression for workdone by an ideal gas in an adiabatic process [2]

b)A refrigeator has a coefficient or performance of 1.95.In each cycle it absorbs $3*10^4$ of heat from cold reservoir.How much heat is discarded to high temperature during each cycle?

15 Given figure represents the sonometer write under certain tension T.

a)Does the frequency of fundamnetal vibration of wire depend on the value of hanging weight?Justify

damental frequency of vibration of the
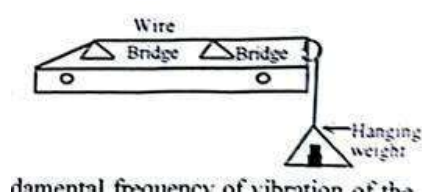
b) What will be the value of fundamnetal frequency of vibaration of the wire if the hanging weight is immersed in a liquid of upthrust U?   [1]

d)   Describe the different modes of vibration in a closed organ pipe   [3]

16 a)Define potential gradient.Express it in terms of specific resistance of the potentiometer wire

b) An unknown resistance R_1 is connected in series with resistance 10.This combination is connected to one of the gaps of a meter bridge ,while another resistance R_2 is connected to next gap. The balance point is obtained at 50 cm.Now,When 10 resistance is removed,the balance point is 40 cm.Find the value of R_1

18 a) Define depletion layer and potential barrier in P-N
          junction diode?   [2]
     b) For the digital circuit given below write the truth table
          showing the outputs Y_1 AND Y_2 for all possible A and
          B
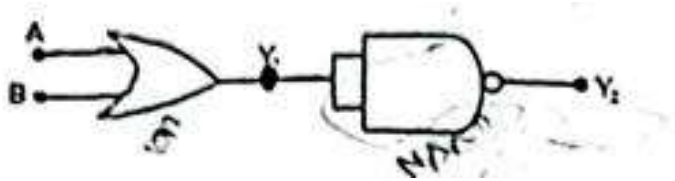
 c) Identify ,which gas is obtained from the above combination
of gates [1]

19 a) Define ionization potential   [1]

   b) The total energy of an electron in the first excited state of
       hydrogen atom is about -3.4 eV.

       i) What is a Potential energy of electron in this orbit ?   [1]

       ii) If the electron in the first excited state jumps to the
       ground state of hydrogen atom then calculates the wave
       length of the emitted radiation.Value of Rydbergs
       Constant,$R = 1.09^7 * 10^{-1}$ [3]

Group C

20 a) Sound waves are called pressure wave.why?

   b) Define one bel.What is threshold of hearing?   [2]

   c) Derive an expression for apparent frequency heard by a
       listener while moving towards stationary source of sound.

   d) A car is approaching a cliff at a speed of 20 m/s .The
       driver sounds a whistle of frequency 800 Hz.Calculate

The frequency of echo as heard by the car driver.[Velocity of sound in air 350m/s]

OR

a) Does interface of light follow the principle of conservation of energy?Justify

b) Obtain the expression for the position of nth order maxima from central bright fringe in Youngs double slit experiment

c) How wide is the central diffraction peak on a screen 3.5 m behind a 0.01 mm slit illuminated 500cm light

d) State and prove Brewsters Law   [1]

21 a) Derive an expression for emf induced in a rectangular coil Rotating in a uniform magnetic field .

b) What are eddy currents ?

c) A 50 cm long wire mass 20 gm is suspended horizontally in transverve magnetic field of flux density 0.6T through two springs at two ends ,Calculate the current required to pass through the wire so that there is zero tension in the springs

OR

a) What is Seebeek effect?

b) How does the thermo-emf produced in a thermo couple vary with the temperature of hot junction,when the cold junction is kept at $0^0\,C$?

c) Derive an expression for the magnetic field strength inside a long current carrying solenoid using Amperes law

d) An alpha particle of mass 6.65×10^{-27} kg travels with a speed of 6×10^{6} m/s at right angle to the magnetic field of 0.2T.Calculate its accleration

22)   In thomsons Method Specific charge of an electron is determined

i)Why is electric field kept perpendicular to the magnetic field in this method ?

ii)What is the ratio of electric to the magnetic field?

b) An electron moves in a circular path of radius 20 cm in a uniform maganetic field of 2×10^{-3} T.Calculate the speed of electron and period of revolution (Mass of electron $= 9.1 \times 10^{-33}$ kg)