

KATHMANDU UNIVERSITY  
End Semester Examination [C]  
July 2024

Marks Scored:

Level : B.E./B.Sc.

Course : PHYS 101

Year : I

Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 15

Registration No.:

Date :

16 JUL 2024

SECTION "A"

[15Q. × 1 = 15 marks]

Choose the most appropriate answer and mark [X] in the box. The symbols, unless mentioned otherwise, have their usual meanings.

- According to work-energy theorem, work done by the resultant forces is equal to  
 change in kinetic energy                       change in potential energy  
 change in mechanical energy                       work done against friction
- Consider two particle of masses  $m_1 = 3\text{kg}$  and  $m_2 = 5\text{kg}$  at a points (0, 2) and (4, 0) respectively. The center of mass of the particles lies at a point  
  $\left(\frac{2}{5}, \frac{3}{4}\right)$                         $\left(\frac{5}{2}, \frac{3}{4}\right)$                         $\left(\frac{3}{4}, \frac{5}{2}\right)$                         $\left(\frac{3}{4}, \frac{5}{2}\right)$
- If the frequency of the driving force is near the natural frequency of the system, then what will occur?  
 Simple harmonic oscillation                       Resonance  
 Damped oscillation                       Forced oscillation
- Two wires of same material have their lengths in the ratio 1:2 and diameters in the ratio 2:1 if both of them are elongated by same forces their elongation are in the ratio  
 2:1                       1:4                       1:8                       8:1
- Water flowing in a horizontal pipe. At one place the radius of the tube is  $R$  and the velocity of water is  $v$ . At another place the radius of the tube is  $4R$ , velocity of water will be  
  $v$                         $4v$                         $\frac{v}{4}$                         $\frac{v}{16}$
- Instead of using two slits in Young's experiment, if we use two separate but identical sodium lamps, then which of the following case will occur?  
 very bright maxima                       very dark minima  
 general illumination                       widely separated interference
- If Newton's ring experiment is performed in some liquid with refractive index  $\mu$  then radius of nth dark ring becomes .....times the radius in air.  
  $\mu$                         $\frac{1}{\mu}$                         $\sqrt{\mu}$                         $\frac{1}{\sqrt{\mu}}$
- Laser light is produced due to  
 stimulated emission of radiation                       spontaneous emission of light  
 interference phenomenon                       diffraction phenomenon

9. Which of the following is one of the essential conditions for observing Fresnel's class of diffraction?  
 both source and screen are at infinite distance from the slit  
 source is infinite distance from the slit  
 screen is infinite distance from the slit  
 neither source nor screen are at infinite distance from the slit
10. If we heat iron pieces in a flame then its color changes into red first, reddish yellow and finally turns to white. The correct explanation for this observation is possible by using:  
 Kirchhoff's law  Stefan's law  
 Wein's displacement law  Newton's law of cooling

**Fill in the blanks with most appropriate answer. The symbols, unless mentioned otherwise, have their usual meanings.**

11. A body of mass  $m = 5g$  is dropped from rest at a height  $h = 10m$  above the earth's surface. Neglecting air resistance, the speed of the body just before it strikes the ground is \_\_\_\_\_
12. The moment of inertia of a uniform circular disc of radius  $R$  and mass  $M$  about any diameter is \_\_\_\_\_
13. The critical angle for water for total internal reflection is  $48.5^\circ$ . Then the value of polarizing angle would be \_\_\_\_\_
14. In single-slit diffraction pattern the ratio of intensity of the third secondary maximum to the central maximum is \_\_\_\_\_
15. Consider an oxygen molecule ( $O_2$ ) rotating in the  $xy$  plane about  $z$  axis. The axis passes through the centre of the molecule, perpendicular to its length. The mass of each oxygen atom is  $2.66 \times 10^{-26} kg$  and at room temperature the average separation between the two atoms is  $d = 1.21 \times 10^{-10} m$  (the atoms are treated as point masses). Then the moment of inertia of the molecule about the  $z$  axis is \_\_\_\_\_