KATHMANDU UNIVERSITY
End Semester Examination
June/July 2024

Marks Scored:

Level : B.Pharm
Year : I

Course : PHYS 104
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date : July-09

SECTION "A"

[20Q. × 1 = 20 marks]

Choose the most appropriate answer and **mark [X]** in the box.

1. An object moving along the x axis is acted upon by a force F_x that varies with position as shown in Fig. 1A. The work is done by this force as the object moves from $x = 2\,\text{m}$ to $x = 8\,\text{m}$ is

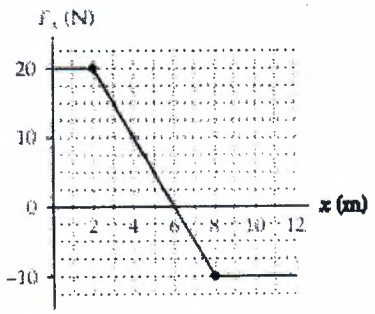

Figure 1A: Plot of force versus distance

[ ] -10 J [ ] 10 J [ ] 30 J [ ] -30 J

2. The work $\vec{F}_{sp} \cdot \overline{dx}$ done by the force exerted by the spring on a mass attached to the end of the spring when the mass has displacement dx is
   [ ] always negative
   [ ] always positive
   [ ] half the time negative and other half time positive
   [ ] positive more than it is negative

3. A body of mass m having an initial velocity v, makes head on collision with a stationary body of mass M. After collision the body of mass m comes to rest and the body of mass M moves. This will happen only when
   [ ] $m = M$ [ ] $m = M/2$ [ ] $m >> M$ [ ] $m << M$

4. If K be the radius of gyration and ℓ be the length of compound pendulum, then K^2/ℓ is the
   [ ] distance between point of suspension and centre of mass of the pendulum
   [ ] distance between point of suspension and point of oscillation of the pendulum
   [ ] distance between point of oscillation and centre of mass of the pendulum
   [ ] length of equivalent simple pendulum

5. A particle performs uniform circular motion with an angular momentum L. If the frequency of particle's motion is doubled and its kinetic energy is halved, the angular momentum becomes

[ ] $\frac{L}{2}$ [ ] $\frac{L}{4}$ [ ] $2L$ [ ] $4L$

6. A particle moves such that its acceleration a is given by $a = -b\,x$, where x is displacement from equilibrium position and b is a constant. The period of oscillation is

[ ] $2\pi\sqrt{b}$ [ ] $\frac{2\pi}{\sqrt{b}}$ [ ] $\frac{2\pi}{\sqrt{a}}$ [ ] $\frac{2\pi}{b}$

7. Bernoulli's theorem is applicable to

[ ] flow of any fluid
[ ] turbulent flow of ideal fluid
[ ] streamline flow of an actual fluid
[ ] streamline flow of an ideal fluid

8. The specific heat of gas

[ ] has only two values C_P and C_V
[ ] has a unique value at given temperature
[ ] can have any value between 0 and ∞
[ ] depends upon the mass of the gas

9. The SI unit of thermal conductivity is

[ ] $Js^{-1}m^{-1}\,^{o}C^{-1}$ [ ] $Jsm^{-1}\,^{o}C^{-1}$ [ ] $Js^{-1}m\,^{o}C^{-1}$ [ ] $Js^{-1}m^{-1}\,^{o}C$

10. X-ray passing through the strong uniform magnetic field

[ ] get deflected along the direction of field
[ ] get deflected opposite to the direction of field
[ ] get deflected perpendicular to the direction of field
[ ] do not get deflected at all

11. A forced oscillator is acted upon by a force $F = F_o \sin\omega t$ and the amplitude of oscillation is given by $A = a\omega^2 - b\omega + c$. The resonant angular frequency is

[ ] $\frac{b}{a}$ [ ] $\frac{b}{2a}$ [ ] $\frac{2b}{a}$ [ ] $\sqrt{b^2 - 4ac}$

12. In Young's double slit experiment, if the wavelength of light is used $6000\,\text{Å}$ and the screen is 40 cm from the slits, the fringes are 0.012 cm apart, then the distance between the slits is

[ ] 0.024 cm [ ] 0.24 cm [ ] 0.2 cm [ ] 2.4 cm

13. In $\gamma-$ decay, the

[ ] daughter nucleus has one proton more than parent nucleus
[ ] daughter nucleus has one proton less than parent nucleus
[ ] parent and daughter nuclei have same number of protons
[ ] daughter nucleus has one neutron more than parent nucleus

14. The source of energy in stars is
[ ] nuclear fusion reaction [ ] nuclear fission reaction
[ ] electron degeneracy [ ] dissociation of atoms

15. A beam of light strikes a piece of glass at an angle of incidence 30°. It is found that the reflected beam is completely plane polarized. Then refractive index of glass is
[ ] 1.50 [ ] 1.55 [ ] 1.0 [ ] 0.57

Fill in the blanks with most appropriate answer:

16. Rotational transitions occur mostly between rotational levels of same _____ state.

17. In a pipe, if the Reynold's number is more than 3000, then the flow is_____

18. The diffraction phenomenon in which source and screen both are separated by the finite distance from slit is called _____

19. The efficiency of Carnot engine is 0.4. If the temperature of the sink is 27°C, then the temperature of source is _____

20. The minimum energy required to break up the stable nucleus into its constituents is called_____