26 NOV 2023

KATHMANDU UNIVERSITY
End Semester Examination [C]
November/December, 2023

Marks Scored:

Level : B.E./B.Sc./B.Tech.
Year : I

Course : PHYS 101
Semester : I

Exam. Roll No. :

Time: 30 mins.

F.M. : 15

Registration No.:

Date : 26 NOV 2023

SECTION "A"

[15Q. × 1 = 15 marks]

Encircle the most appropriate alternative from each set of choices.

1. A spring when compressed by 10 cm develops a restoring force of 10 N. A body of mass 4 kg is attached to it. Then the compression of the spring due to weight of the body is
   a. 0.392 m b. 0.492 m c. 0.592 m d. 0.692 m

2. A body of 10 kg mass explodes breaking into two pieces of masses 6 kg and 4 kg respectively. The velocity of 6 kg mass is 6m/s, then the velocity of other mass will be
   a. 12m/s b. 9m/s c. 36m/s d. 48m/s

3. For a body rotating in a central force field, an increase in its rotational inertia
   a. results in an increase in its angular velocity
   b. results in a decrease in its angular velocity
   c. has no effect on its angular velocity
   d. causes its angular velocity to first decrease and then increase

4. A body of mass 3kg elastically collides with another body at rest and afterwards continues to move in original direction but with ½ th of its original speed. The mass of body initially at rest will be
   a. 2.5 kg b. 3.0 kg c. 2.0 kg d. 1 kg

5. The radius of gyration of a circular disc of radius R about an axis through its centre and perpendicular to its plane is
   a. $\frac{5R}{\sqrt{2}}$ b. 2R c. $\frac{R}{2}$ d. $\frac{R}{\sqrt{2}}$

6. If the point of suspension is at midpoint of the rod of length 50 cm, then the time period is
   a. 1.4 sec b. 0.62 sec c. zero d. infinity

7. If length of wire is doubled, then it's Young's modulus
   a. remains same b. becomes double
   c. becomes half d. becomes triple

8. In interference experiment, the intensities of bright and dark fringes are 4 and 1 units respectively, then the amplitudes of source are in the ratio
   a. 1:2 b. $\sqrt{1}:\sqrt{2}$ c. 3:1 d. 1:3

9. The specific rotation of 20% sugar solution is 70 in SI units. If the length of the polarimeter tube containing sugar solution is 20 cm, the plane of polarization of light is rotated by:
a. 10° b. 28° c. 12° d. 31°

10. An atom or molecule in the ground state of energy E_1 can absorb a photon of energy hv and go the higher energy state E_2, then the process is known as
a. Stimulated radiation
b. Stimulated absorption
c. Stimulated emission
d. Spontaneous absorption

Fill the following blanks with appropriate answers.

11. What will be the angle of refraction in the glass, if the polarization angle for the air-glass interface is 53.5°? _____

12. What is the highest order spectrum which may be seen with a monochromatic light of wavelength 5000 Å by means of a diffraction grating with 5000 lines/cm?_____

13. The maximum possible exhaust velocity of rocket is 2 kms^{-1}, ratio of M_o/M for it to gain escape velocity of 11.2 kms^{-1} is _____

14. Water is flowing steadily through two horizontal pipes of radii 3 cm and 6 cm connected in series. The speed of water in the first pipe is 2 m/s and the pressure of water in it is 2×10^4 Pascal. The pressure of water in the second pipe will be nearly _____

15. The area of glass of a window of a room is 5 m^2 and thickness is 3mm. The outer and inner temperatures are 40°C and 25°C respectively. Thermal conductivity of glass is 1.2 $Wm^{-1}K^{-1}$. The heat flowing in the room per second will be _____