GOVIND VIDYALAYA TAMULIA

SAMPLE PAPER –IV (2014-2015)

STD- XI

PHYSICS

SET-B

Time : 3 hours **Maximum Marks : 70**

General Instruction :

(i) All questions are compulsory.
(ii) There are **30** questions in total. Questions **1** to **8** are very short answer type questions and carry **one** mark each.
(iii) Questions **9** to **18** carry **two** marks each, questions **19** to **27** carry **three** marks each and questions **28** to **30** carry **five** marks each.
(iv) One of the questions carrying three marks weightage is value based question
(v) There is not overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and all three question of five marks each weightage. You have to attempt only one of the choices in such questions.
(vi) Use of calculators is **not** permitted. However, you may use log tables if necessary.
(v) Please write down the serial number of question before attempting it.
(vi) You may use the following values of physical constant wherever necessary.
Boltzmann's constant K = 1.38×10^{-23} JK^{-1}
Avogadro's number NA = 6.022×10^{23}/mol
Radius of Earth R = 6400 km.

1.Express one micron in metre. 1

2. What does the slope of velocity-time graph represent? 1

3. What is the angular velocity of the hour hand of a clock? 1

4. What is the principle of working of a rocket? 1

5. Why do we slip on a rainy day? 1

6. What is the source of the kinetic energy of the falling rain drop? 1

7. Two bodies move in two concentric circular paths of radii r_1 and r_2 with same time period. What is the ratio of their angular velocities? 1

8. State second law of thermodynamics. 1

9. If x = at + bt^2, where x is in metre and t in hour, what will be the unit of'a' and 'b'? 2

10. . A gunman always keep his gun slightly tilted above the line of sight while shooting. Why? 2

OR

A car moving with a speed of 50 kmh^{-1}can be stopped by brakes after at least 6 m. What will be the minimum stopping distance, if the same car is moving at speed of 100kmh^{-1} ? 2

11. A particle of mass m is moving in an horizontal circle of radius 'r', under a centripetal force equal to (k/r^2), where k is a constant. What is its potential energy? 2

12. Two solid spheres of the same are made of metals of different densities, which of them has larger moment of inertia about its diameter? Why? 2

13. If suddenly the gravitational force of attraction between the earth and a satellite revolving around it becomes zero, what will happen to the satellite? 2

14. When air is blown in between two balls suspended close to each other, they are attracted towards each other. Give reason. 2

15. What is an isothermal process? Also give essential conditions for an isothermal process to take place. 2

16. Calculate the fall in temperature of helium initially at 15°C, when it is suddenly expanded to 8 times its volume. Given γ = 5/3. 2

17. Three vessels of equal capacity have gases at the same temperature and pressure. The first vessel contains neon (monoatomic), the second vessel contains Cl_2(diatomic) and third contain polyatomic gas. Do the vessel contain equal number of molecules? Is the root-mean square speed of molecules same in three cases? 2

18. A particle is in linear simple harmonic motion between two points A and B, 10 cm apart, Take the direction from A to B as positive direction and give the signs of velocity and acceleration on the particle when it is
(i) At the end B
(ii) At 3 cm away from A going towards B 2

19. Draw displacement-time, velocity-time and acceleration-time graphs for a Particle executing simple harmonic motion. 3

OR

A bat emits ultrasonic sound of frequency 1000 kHz in air. If the sound meets a water surface, what is the wavelength of (a) the reflected sound (b) transmitted sound?

Speed of sound in air v_a = 340 ms^{-1}, in water v_w= 1486 ms^{-1}

20. (i) Define Absolute Zero.
(ii) Deduce the dimensional formula for R, using ideal gas equation PV = nRT
(iii) Find degree of freedom of a monoatomic gas.
3

21. Define the term gravitational potential. Give its S.I. unit. Also derive expression for the gravitational potential energy at a point in the gravitational field of the earth. 3

22.(a). Ratan noticed that his grandfather to be suffering from fever. He took him to the doctor The doctor gave him some pills .When the pills were used he sweated much, after some time became normal.Rahim enquired the Doctor about how his grandfather became normal .

(a)According to you what values are possessed by Ratan?

(b) A child running a temperature of 101°F is given an Antipyria which causes an increase in the rate of evaporation of the body. If the fever is brought down to 98°F in 20 mts**, (b) what is the amount of heat lost by the body? . The mass of the child is 30 kg.** **3**

23. Write S.I. unit of torque and angular momentum. Also deduce the relation between angular momentum and torque. 3

24. Show that the total mechanical energy of a freely falling body remains constant throughout the fall. 3

25. Two masses 8 kg and 12 kg are connected at the two ends of a light Inextensible string that goes over a frictionless pulley. Find the acceleration of the masses, and the tension in the string when the masses are released. [g = 9.8 ms^{-2}] 3

26. The position of a particle is given by r= (3 t i+2 t^2j+4 k) m
Where t is in seconds, r is in meters and the coefficients have the proper units.
(a) Find the velocity v and acceleration a.
(b) What is the magnitude of velocity of the particle at t = 2 s? 3

27. Two vectors A and B are inclined to each other at an angle θ. Using triangle law of vector addition, find the magnitude and direction of their resultant. 3

28. What is the need for Banking of road? Obtain an expression for the maximum speed with which a vehicle can safely negotiate a curved road banked at an angle θ. The coefficient of friction between the wheel and the road is μ. 5

OR

Derive expression for the orbital velocity of a satellite and its time period. What is a geostatinary satellite. Obtain the expression for the height of the geostationary satellite.

29. State and prove Bernoullis theorem. Give its limitation. Name any twoapplication of the principle. 5

OR

(i) Explain the terms specific heat and heat capacity.
(ii) State Newton's law of cooling. Derive mathematical expression for it.

30. Show that total mechanical energy *E* of a particle executing simple harmonic motion is constant and equal to $\frac{1}{2}KA^2$, where $K = m\omega^2$, m = mass and ω is angular velocity and A is the maximum amplitude. Also draw the graph of potential energy, kinetic energy and total energy of the particle. 5

OR

Obtain an expression for a standing wave formed and obtain the position of nodes and antinodes.

BY: MD WASIM IQBAL (PHYSICS FACULTY)

(GOVIND VIDYALAYA TAMULIA)