**Sample Paper – 2013  
Class – XI  
 Subject –Physics**

**MM=70 Class:- XI Time= 3 hrs. Subject:-Physics**

**General Instructions:-**

***1. All questions are compulsory. Symbols have their usual meaning.***

***2. Use of calculator is not permitted. However you may use log table, if required.***

***3. Draw neat labelled diagram wherever necessary to explain your answer.***

**4. *Q.No. 1 to 8 are of very short answer type questions, carrying 1 mark each.***

**5. *Q.No.9 to 18 are of short answer type questions, carrying 2 marks each.***

**6. *Q. No. 19 to 27 carry 3 marks each.***

***7. Q. No. 28 to 30 carry 5 marks each.***

Q.1 You are given a thread and a meter scale. How will you estimate the diameter of the thread?

Q.2 How many cm are there in 100 nm?

Q.3 What is the ratio of **A.B** to **A x B** when angle between **A** and **B** is 300?

Q.4 What would be the pressure inside a water surface when you are at a depth of 140 m.

Q.5 An electric lamp of power 200 W is glowing for 30 minutes. Find the amount of energy consumed.

Q.6 State Newton’s universal law of gravitation and express it in vector form.

Q.7 Find the height above the earth surface where value of acceleration due to gravity is same as that at 20 m deeper inside the earth.

Q.8 A light body and heavy body have equal kinetic energy, which one have greater

momentum?

Q.9 What is the effect on viscosity of liquids when temperature is increased?

**OR**

Write down the dimension formula of velocity gradient..

Q.10 State Galileo’s law of odd number. If an object under free fall covers 49 m during the forth time interval. Find the distance covered during nineth time interval.

Q.11 Draw the Position – Time graph for following cases when

( i) Object is moving with positive acceleration.

( ii) An object is under free fall

Q.12 The escape velocity of a particle on earth is 11.2 km/s. What is its value for a planet having double the radius and 8 times the mass of earth?

Q.13 A car covers the first half of the distance between the two places at a speed of 40 km/h andsecond half at 60 km/h. Calculate the average speed of the car.

Q.14 Explain: i) Why china plates are wrapped in in paper or straw pieces while packing?

ii) Bullet of equal mass are fired from a gun and a heavy rifle, in which the recoiling will be more and why?

Q.15 What do you mean by contact and non contact force. Give one example of each case.

Q.16 Derive the necessary relation for orbital velocity of a satellite.

Q.17 Explain with reason Why:

(a) A brass tumbler feels much colder than a wooden tray on a chilly day.

(b) The earth without its atmosphere would be inhospitably cold.

**OR**

Explain following with proper reason.

(a) Why blood pressure in humans is greater at the feet than at brain?

(b) Why does an engine require more time / kicks to get started during winters?

Q.18 State Hooke’s law. Explain Stress – Strain curve of a material when subjected under extended load.

Q.19 State and prove Work- Energy Theorem. Find out the work done by a force, which increases the velocity of 20 kg mass from 12 m/s to 90 km/h in 10 seconds.

Q.20 Two physicists, both of mass 50 kg, climb up identical ropes suspended from the ceiling of a gymnasium. The ropes are 15 m long. Physicist 1 reaches the top twice as quickly as Physicist 2 does. After reaching at top, they argue about who did more work agaists gravity:

**Physicist 1:**

“ I did more work fighting gravity, because I was overcoming gravity more quickly. Your climb was lazier, and therefore, you did less work.”

**Physicist 2:**

“ No way. I did more work fighting gravity, because I spent more time climbing the rope. Since we both ended up at the same height, but I spent more time getting there, I had to work harder .”

i) Which physicist, if either, did more work against gravity while climbing from floor to ceiling ? a)Physicist 1 did more work b)Physicist 2 did more work c)Both did the same work d) Neither physicist did any work

ii) Physicist 2 started at rest from the f loor and ended at rest near ceiling . Which of the following best expresses the net energy transfer during this process? a)Chemical to kinetic b)Chemical to potential c)Kinetic to chemical d)Kinetic to potential

iii) Physicist 1 started falling from ceiling onto a heavily-padded cushion, safely coming to rest. Which of the following best expresses the net energy transfer during this process? a)Chemical to kinetic to heat b)Potential to chemical to heat c)Potential to kinetic to heat d)Kinetic to potential to chemical

Q.21 The displacement (in metre) of a particle moving along x-axis is given by x = 20t + 5t2 . Calculate

1. the instantaneous velocity at t = 2 seconds.
2. average velocity between t = 4s & t = 7s
3. Instantaneous acceleration.

Q.22 a) Prove that log 160 = 3 log 4 + 2 log 10 – log 40

b) Evaluate ( 5 x + 4x2 ) dx

c) Define dot product of two vectors. Prove that . = 0 .

Q.23 What do you mean by acceleration due to gravity? Derive the necessary relation for variation of ***g*** with depth.

Q.24 Define force. Write its dimensional formula. Prove that F= m x a, using Newtons II law.

Q.25 A man of mass 70 kg stands on a weighing scale in a lift which is moving

a) upwards with a uniform speed of 10 m/s

b) downwards with a uniform acceleration of 5 m/s2

c) upwards with a uniform acceleration of 5 m/s2

What would be reading on the scale in each case?

Q.26 State Pascal’s law. How it can be used in Hydraulic brakes. Explain its working with diagram.

Q.27 Define and derive the term associated with projectile motion: i) Time of flight ii) Horizontal range.

Q.28 i) What do you mean by friction? Write its types. ii) How does it vary with weight of the object? iii) How does it vary with area of contact? iv) What happens to force of friction if two surfaces in contact are made extremely smooth? v) Write any two methods to reduce the friction.

OR

Explain the bending of a cyclist during taking a circular turn. Calculate the angle through which the cyclist bend with the vertical when he crosses the circular path 34.3 in circumference in √22 seconds.

Q.29 State and explain the principle of law of conservation of energy.Prove it for freely falling bodies.

OR

Show that in a head-on collision between two balls of equal masses moving along a straight line, the balls simply exchange their velocity.

Q.30 (a) What is angle of contact? When it is obtuse ? When it is acute?

(b) Define terminal velocity of a fluid. Derive the expression for it.

**OR**

State and prove Bernoulli’s theorem. Explain any one application of it.

**Vatsalya Public School, Mandsaur**