**Physics – First Year**

**PAPER – I (JUNE – 2010)**

Time : 3 Hours | Max.Marks : 60

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**SECTION – A**

**Note :** i) Answer **all** the questions. $10 \times 2 = 20$

ii) Every correct answer carries 2 marks.

iii) All are Very short answer type questions.

1. Prove the Planck's constant and angular momentum have same dimensions.
2. A force is $2\bar{i} + 3\bar{j} + 2\bar{k}\,\mathrm{N}$ acts on a body for 4 sec., and produces a displacement of $3\bar{i} + 4\bar{j} + 5\bar{k}\,\mathrm{m}$. Calculate the power.
3. Distinguish between Elastic collision and Inelastic collision.
4. What happens to the frictional force, if the surfaces is moderately polished and heavily polished?
5. Define Poisson's ratio. Write the theoretical limits of Poisson's ratio.
6. What should be the radius of a capillary tube, if the water has to rise the height of 6 cm in it?

   Surface Tension of water $= 7.2 \times 10^{-2}\ \mathrm{N/m}; \mathrm{g} = 10\,\mathrm{m/sec^2}$
7. The variation of viscosity in liquids and gases with temperature is opposite. Why?
8. Why gaps are left between rails on a railway track?
9. The coefficient of linear expansion of Nickel is $13 \times 10^{-6}/^{o}\mathrm{C}$. Find its coefficient of areal and cubical expansion.
10. State the First law of Thermodynamics.

**SECTION – B**

**Note:** i) Answer any **six** questions. $6 \times 4 = 24$

ii) Every correct answer carries 4 marks.

iii) All are Short answer type questions.

11. Write parallelogram law of Vectors. Derive an equation for the magnitude and direction of the resultant vectors with neat diagram.

12. Show that for a projectile launched at an angle of 45º, the maximum height of the projectile is one quarter of the range.

13. Obtain the Centre of mass of a system of 4 particles 1kg, 2kg, 3kg and 4 kg respectively located at the corners of square of 1 meter side. Take origin at 1 kg; 2 kg and 3 kg are on x-axis and y-axis.

14. Why pulling the lawn roller is preferred than pushing the lawn roller?

15. State and prove parallel axes theorem.

16. What is orbital velocity? Obtain an expression for it.

17. Write short note on Triple point of water.

18. Explain Kirchhoff's law of Radiation and give two applications of Kirchhoff's law.

## SECTION – C

**Note :** i) Answer any **two** of the following questions. $2 \times 8 = 16$

ii) Every correct answer carries 8 marks.

iii) All are Long answer type questions.

19. State the law of conservation of energy and verify it in the case of a body projected vertically upwards.The momentum of a body is doubled. By what percentage does its kinetic energy increase ?

20. Show that the motion of a simple pendulum is simple harmonic and hence derive an equation for its time period.

**The length of a seconds pendulum at a place is 1.02 m. Find the time period of another pendulum of length 0.51m at the same place.**

21. Define pressure coefficient of Gas. How can we determine the pressure coefficient of gas by using Jolly's bulb apparatus.