



KATHMANDU

DON BOSCO COLLEGE**1st Terminal Examination - 2061**Class: XI
Time: 3 Hrs

Subject: Physics

F.M: 75
P.M: 30**(ANSWERS TO THE NUMERICAL PROBLEMS SHOULD BE IN SI UNITS.)**Group A

1. Answer in brief: [4×2]
- Check the correctness of the relation $P = \rho gh$ by dimensional method, where 'ρ' denotes the density of a liquid, 'g' denotes the acceleration due to gravity, 'h' gives the height of the liquid in a barometer and 'P' is the pressure of the atmosphere.
 - Give an example of a condition in which the velocity and acceleration of a body is perpendicular to each other at an instant.
 - Is it possible for the resultant effect of two forces to be less than each of the forces?
 - Why is it said that Newton's Second Law of Motion gives the quantitative definition of force?
2. a. Derive an expression for the magnitude and direction of the resultant force when two forces act simultaneously on a body at a certain angle. [5]
- b. A body travels a certain distance at a uniform rate of 40 m/sec. and returns back at 60 m/sec. Find the average speed. [4]
3. a. Prove that the path of a body fired horizontally off a raised platform follows a parabolic path. Hence determine its time of flight and range. [4]
- b. A ball is dropped vertically from a height of 20 m and rebounds with a velocity which is $\frac{3}{4}$ of the velocity with which it hit the ground. What is the time interval between the first and second bounces? (Assume the value of 'g' as 10 m/sec².) [4]

Group B

4. Answer in brief: [2×2]
- If a metallic ring is heated uniformly, what happens to the inner radius?
 - When a thermometer is used to measure temperature, the mercury level first falls and rises later only, why?
5. a. Determine the relationships between the coefficients of linear, superficial and bulk expansion? [4]
- b. A steel cylinder has an aluminium piston and, at a temperature of 20 °C, when the internal diameter of the cylinder is exactly 10 cm, there is an all around clearance of 0.05 mm between the piston and the steel cylinder wall. At what temperature will the fit be perfect? (The linear expansivities of steel and aluminium alloy are 1.2×10^{-5} /K and 1.6×10^{-5} /K respectively.) [4]

Group C

6. Answer in brief: [2×2]
- You can see the reflection of your face off a plane mirror or even a shiny metal plate, but not off a piece of paper, though all of them are reflectors, why?
 - A convex mirror always diverges a beam of light falling into it, why?
7. a. Prove that $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$ for a concave mirror in which u, v and f denote the object distance, the image distance and focal length respectively. Also state and explain the assumptions made for the derivation. [5]
- b. A concave mirror of small curvature and focal length 20 cm forms image whose size is twice the size of the object. Find the object and image distances. [4]

Group D

8. Answer in brief: [2×2]
 a. A charged conical conductor loses its charge earlier than a spherical body charged to the same potential, why?
 b. Electric shock might be observed by a person touching a running car, why?
9. a. State Gauss Theorem and derive an expression for the electric field intensity due to a conducting charged sphere at a point outside it. [5]
 b. Three points A, B and C form an equilateral triangle of side 1 cm. point charges of 1 μC are placed at A and B. find the electric field intensity at C due to these charges, assuming both charges are positive in nature. ($\epsilon_0 = 8.854 \times 10^{-12} \text{ C}^2/\text{Nm}^2$). [4]

Group E

10. Answer in brief: [2×2]
 a. Why are alloys like constantan and manganin used to make standard resistances?
 b. Although the drift velocity of electrons is very low, an electric bulb turns on almost instantly, when the switch is closed, why?
11. a. What is drift velocity? Explain the mechanism of metallic conduction through the conductor. [4]
 b. A moving coil meter has a resistance of 25 Ω and indicates full scale deflection when a current of 4 mA flows through it. How could this meter be converted to a milliammeter having full scale deflection for a current of 50 mA? [4]

The only difference between something ordinary and something extraordinary is that 'extra'.