



KATHMANDU

DON BOSCO COLLEGE

Second Terminal Examination - 2060

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, any four questions: [4 X 2 = 8]
- A heavy and another light ball are projected in the same direction with the same velocity from the same point. Which one will attain more height, cover more range and take more time of flight?
 - Why does a bullet fired against a glass pan of a window makes a clear hole but a stone thrown at it makes a crack?
 - A thief weighing 60 kg jumps from the window of a house, with a box of 40 kg in his hand. How much weight of the box will he experience?
 - When bullet is fired from a gun, the gun recoils or gives a kick in the backward direction. Explain why?
 - It is easier to pull than to push a lawn roller, why?
 - Athletes run some distance before taking a long jump. Why?
2. a. Prove that trajectory of a projectile motion is parabolic. Find equation for time of flight and horizontal range. [5]
- b. A man is going due east with a velocity of 3 km/hr. Rain falls vertically downwards at a speed of 10 km/hr. Calculate the angle at which he should hold the umbrella so to save himself from the rain. [4]
3. a. State and prove the conservation of linear momentum. [4]
- b. A hose directs a horizontal jet of water, moving with a velocity of 20 m/s, on to a vertical wall. The cross sectional area of a jet is $5 \times 10^{-4} \text{ m}^2$, if the density of water is 1000 Kg m^{-3} . Calculate the force on the wall assuming that water is brought to rest there. [4]

Group B

4. Answer in brief, any two questions: [2 X 2 = 4]
- Can a body have zero velocity and still be accelerating?
 - Why does powdered glass appear white and opaque but becomes transparent when water is poured over it? Explain
 - An electric bulb lights up almost instantly when switched on, although the drift velocity of electrons is very small, why?
5. a. What is lateral shift? Obtain an expression for it. Give an idea to find the thickness of glass slab from the concept of lateral shift. [5]
- b. A certain prism is found to produce a minimum deviation of $51^{\circ}0'$ while it produces a deviation of $62^{\circ}48'$ for two values of the angle of incidence, namely $40^{\circ}6'$ and $82^{\circ}42'$ respectively. Determine the refracting angle of the prism, the angle of incident at minimum deviation and the refractive index of the material of the prism. [4]

Group C

6. Answer in brief, any two questions: [2 X 2 = 4]
- Why does diamond sparkle with great brilliancy?
 - Can you tell by looking whether an image is real or virtual? How can the two be distinguished?
 - Why does a crack in glass pane appear shining when viewed from a suitable direction?
7. a. Find the relationship between refractive index, angle of prism and minimum deviation. [5]

Or

Obtain relation $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$, for a convex mirror.

- b. An object of 4 cm height is placed at a distance of 15 cm from a concave lens of focal length 10 cm. Find the nature, size and position of the image. Draw the necessary ray diagram. [4]

Group D

8. *Answer in brief, any two questions:* [2 X 2 = 4]
- A man inside a hollow metallic insulated cage does not receive a shock although it is connected to high voltage supply, why?
 - Can two equipotential surfaces intersect each other?
 - Repulsion is the sure test for testing the nature of the charge. Justify this statement.
9. a. State and prove the Gauss's law in electrostatics. Apply it to find the electric potential due to infinite plane conductor. [5]

Or

Define electric potential. Drive an expression for the electric potential at a point due to a point charge.

- b. Two plane parallel conducting plates 15 mm apart are held horizontal, one above the other, in air. The upper plate is maintained at a positive potential of 1500 V while the lower plate is earthed. Calculate the number of electrons which must be attached to a small oil drop of mass 4.9×10^{-15} kg, if it remains stationary in the air between the plates. (Assuming the density of air is negligible in comparison with the oil)
- If the potential of the upper plate is suddenly changed to -1500 V, what is the acceleration of the charged drop? [4]

Group E

10. *Answer in brief, any two questions:* [2 X 2 = 4]
- The thermal speeds of the free electrons in a conductor are quite large. Then, why don't they escape from the surface of the conductor?
 - A conductor is carrying a current which is charge per unit time. Can you say that the conductor was charged?
 - You are given 'n' wires each of resistance 'R'. What is the ratio of maximum to minimum resistance that can be obtained from these wires?
11. a. Derive the relation for heat generated in a conductor when electricity is passed through it, hence state Joule's law. [4]

Or

Derive relation for effective resistance for (i) resistors in series and (ii) resistors in parallel.

- b. A galvanometer has current sensitivity and voltage sensitivity 10 divisions/mA and 2 divisions/mV respectively. The total number of divisions in its scale is 100. How can you convert the galvanometer into (i) an ammeter of range 0-10 A, (ii) a voltmeter of range 0-50 V. [3]

“Education is the ability to listen to almost anything without losing your temper or your confidence.”



KATHMANDU

DON BOSCO COLLEGE

2nd Terminal Exam - 2060

Stream: Science
Subject: Chemistry

Class: XI
Time: 3 hrs.

F. M.: 75
P. M.: 27

Group A

Attempt any fifteen questions:

[15x2=30]

1. What does the molecular formula of a compound signify? Name a compound whose empirical formula is the same as the molecular formula.
2. Define molar volume of a substance.
3. The cost of table sugar ($C_{12}H_{22}O_{11}$) is Rs. 29 per kg. Calculate its cost per mole.
4. Why don't mixtures obey the law of constant composition?
5. The molecular mass of NaCl obtained from colligative properties is abnormal, why?
6. Why are amorphous solids considered to be super cooled liquids?
7. What is compressibility factor? What is its value for an ideal gas?
8. The tire of an automobile is inflated to a slightly lower pressure in summer than in winter, why?
9. What do you mean by lone pair of electrons? Calculate the number of lone pair and bond pair of electrons in CO_2 molecule.
10. Fe^{3+} is more stable than Fe^{2+} , why?
11. Why is H_2 possible but not Na_2 ?
12. Write the correct orbital notations for each of the following sets of quantum numbers
(i) $n = 2, l = 0, m = 0$ (ii) $n = 2, l = 1, m = -1$
13. What are the differences between orbits and orbitals?
14. Why has the zero group been placed at the extreme right of the periodic table?
15. What is the importance of ozone for plants and animal life on earth?
16. Why is the colour of concentrated nitric acid generally yellow?
17. What do you know about ortho and para hydrogens?
18. What is the ring test? Which ion is confirmed by this test?
19. Why is the solution of an alkali metal in ammonia blue in colour?
20. Sodium metal can not be obtained by the electrolysis of aqueous solution of sodium chloride, why?
21. Gold occurs in metallic state but potassium occurs only in combined state, why?
22. Carbon tetrachloride does not give white precipitate with $AgNO_3$ solution, why?

Group B

Attempt any five questions:

[5x5=25]

23. Derive the relation - Molecular mass = 2 × Vapour Density
24. An aqueous solution of a dibasic acid (mol. wt. = 98) containing 49 gm of the acid per liter of the solution has density 1.430 gm/cm^3 . Express the concentration of the solution in terms of
(a) molarity (b) molality (c) normality.
25. Lewis symbols of three elements are as follows:

\ddot{P}

$:\ddot{Q}:$

$:\ddot{R}:$

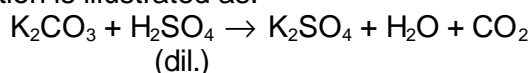
- a. Write the Lewis structure of molecules formed between (i) P and Q (ii) Q and R
 - b. Write two properties of the compound formed between P and Q.
26. Discuss the principle involved in the Haber's process for the manufacture of ammonia.
27. Write down the principle involved in the manufacture of Na_2CO_3 by Solvay's process.
28. Explain Pauli's Exclusion principle and Aufbau principle. What do you mean by $(n + l)$ rule?
29. What are oxides? How are they classified? Give examples of each.

Group C

Attempt any two questions:

[10x2=20]

30. A reaction is illustrated as:



If 14 gms of pure K_2CO_3 is added to a solution of 6 gms of H_2SO_4 ,

- a. Find the limiting reactant.
 - b. Calculate the no. of moles of excess reactant left over unreacted.
 - c. Calculate the volume of CO_2 gas produced at NTP.
 - d. Calculate the no. of grams of KOH required to absorb whole of the CO_2 gas as K_2CO_3 . (Atomic weight of K = 39, S = 32, C = 12, O = 16).
31. State Boyle's Law and Charle's Law. Derive the relation $PV = nRT$. A gas cylinder containing cooking gas can withstand pressure of up to 14.9 atmospheres. The pressure gauge of the cylinder indicates 12 atmospheres at 27°C . Due to a sudden fire in the building, the temperature starts to rise. Find the temperature at which the cylinder will burst?
32. What are quantum numbers? Mention their significance. Which orbitals namely 1p, 2p, 3p, 4p, 2d are not possible?
33. Write short notes on (any two):
- a. Allotropes of Sulphur.
 - b. Down's process of manufacture of Na metal.
 - c. Distinguish between organic and inorganic compounds.
 - d. Determination of atomicity of hydrogen and chlorine.

Best of Luck