KATHMANDU

DON BOSCO COLLEGE

Pre Board Examinations - 2061

Sub. Code: 110

Class: XI	**Subject: Physics**	**F.M: 75**
Time: 3 Hrs	**Set: I**	**P.M: 30**

Candidates are required to give their answers in their own words as far as practicable. The figure in the margin indicates full marks. Answer of all numerical problems should be expressed in SI system

Group 'A'

1. Answer, in brief, ***any four*** questions: [4 x 2 = 8]
   a. A bob of mass 0.1 kg hung from the ceiling of a room by a string 2 m long is set into oscillation. The speed of the bob at its mean position is 1m/s. what is the trajectory of the bob, if the string is cut when bob is at extreme position and at mean position.
   b. Why is a person forced towards the side of his/her seat radially outward in a merry-go round?
   c. Do the forces of friction and other contact force arises due to gravitational attraction? If not, what is the origin of these forces?
   d. The girl is swinging a swing in sitting position. How will the period of the swing be effected, if she stands up?
   e. How will you distinguish between hard boiled egg and a raw boiled egg by spinning each on a table top?
   f. Why does a balloon stop rising when it has attained a certain height in the sky?

2. a. Define centripetal force and derive an expression for centripetal force. [5]

   Or

   Find out an expression for the total energy of a particle executing SHM and prove that total energy of a system is conserved. [5]
   b. An iceberg of volume 100 m^3 and density 920 kgm^{-3} floats in water of density 1030 kgm^{-3}. What portion of iceberg will be above the water surface? [3]

3. a. Show that the acceleration due to gravity at the centre of earth is zero. [4]
   b. A train of mass 2×10^5 kg moves at a constant speed of 72 km/hr up a straight incline against a friction force of 1.28×10^4 N. The incline is such that the rain rises vertically 1 m for every 100 m traveled along the incline. Calculate (i) the rate of increase per second of the potential energy of the train (ii) the necessary power developed by train. [4]

Group 'B'

4. Answer, in brief, ***any two*** questions: [2 x 2 = 4]
   a. Why do clock pendulums made of invar (alloy of nickel and steel)?
   b. The RMS speeds of gas molecules are around 500 m/sec. but the smell of perfume takes a long time to spread throughout the room, why?
   c. Is it possible that when one end of a rod is heated, then after sometime, the temperature of the entire rod become the same? Under what conditions would this happen?

5. a Describe a method, with necessary theory, to determine the Specific Latent Heat of Fusion of Ice. [5]

   Or

   Define Coefficient of Thermal Conductivity of a material and explain Searle's method to determine it for a metallic solid. [5]
   b. A steel cylinder has an aluminium piston and, at a temperature of 20 ^{0}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, ***any two*** questions: [2 x 2 = 4]
   a. What is the reason behind the appearance of rainbows?
   b. An observer at a distance gets an impression that an object on the surface of earth is floating in air, in cold regions, why?
   c. What would be the focal length of a lens immersed in a liquid of refractive index μ_l?

7. a. Derive lens maker formula. [5]

Or

Prove that $\mu = \dfrac{\sin\left(\dfrac{A+\delta_m}{2}\right)}{\sin\dfrac{A}{2}}$, where symbols have their usual meaning. [5]

   b. A 60^0 glass prism has refractive index 1.5. Calculate the angle of emergence of the light at maximum deviation. [4]

Group 'D'

8. Answer, in brief, ***any two*** questions: [2 x 2 = 4]
   a. The electric potential is constant in a region. What can you say about electric field there?
   b. How does a dielectric differ from an insulator?
   c. What are the uses of studying the hysteresis curve for a given material?

9. a. State Gauss's theorem. Describe how you would use it to determine field outside a charged plane conductor. [5]

Or

Derive an expression for the magnetic field intensity of a bar magnet at a point on broad side on position at a specified distance. [5]

   b. A 100 μf capacitor is in electronic flash gun provide 50 J of energy. To what p.d. must the capacitor be initially charged? [4]

Group 'E'

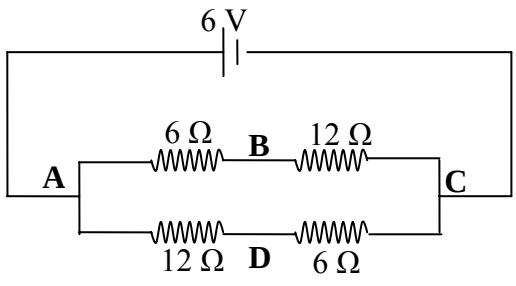
10. Answer, in brief, ***any two*** questions: [2 x 2 = 4]
    a. Does an electromotive force have unites of force?
    b. If the length of a wire be doubled by stretching, what will happen to its resistance?
    c. The light from a bathroom bulb gets dimmer for a moment when the geyser is switched on. Why?

11. a. What is the principle of potentiometer? How can you use it to compare the emf of two cells? [5]

Or

State and explain Kirchhoff's Laws. [5]

    b. In the given fig. what is the p.d between the points B and D? [3]



Best of Luck

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Group 'A'

1. Answer, in brief, ***any four*** questions: [4 x 2 = 8]
   a. Does a moving object have impulse?
   b. A lorry and a car moving with same k.e. are brought to rest by the application of brakes which provide equal retarding forces. Which of them will come to rest in shorter distance?
   c. Why is it more difficult to revolve a stone by tying it to a longer string than by tying it to a shorter string?
   d. If the diameter of the earth become twice its present value its mass remains unchanged, then how would the weight of an object on the surface of the earth be affected?
   e. An object is thrown into a deep lake. As it sinks deeper and deeper into the water, how does the buoyant force change?
   f. When the displacement is half of the amplitude, what fraction of total energy of simple harmonic oscillator is kinetic?

2. a. Explain why cyclist should incline himself to the vertical while moving round a circular path. Obtain the expression for his inclination with the vertical. [5]

   Or

   Define SHM. Obtain an expression for the time period of a simple pendulum. [5]

   b. What horse power must the engine of a vehicle of mass 2000 kg develop if it is to drive up an incline of 1 in 10 with a speed of 12 m/sec.? The resistance due to friction is 200 N (g = 10 $msec^{-2}$). [3]

3. a. Show that gravitational potential energy at a point is $\frac{-GMm}{r}$, where symbol have their usual meanings. [4]

   b. A rectangular tank 10 m long, 3m broad and 2 m deep is full of water. Find the thrust on each face. [3]

Group 'B'

4. Answer, in brief, ***any two*** questions: [2 x 2 = 4]
   a. Explain why dew forms more prominently at the blades of grass on cooler nights?
   b. Cooling is caused by evaporation. Explain, why?
   c. How is that ice cream appears cooler to the mouth than water at 0 ^{0}C.

5. a How are the coefficients of Superficial Expansion and Bulk Expansion related to the coefficient of Linear Expansion?. [5]

   Or

   Explain what is meant by (a) a black body and (b) Black Body Radiation. State and explain Stefan's Law of black body radiation. [5]

   b. A lead bullet strikes a target with velocity of 500 m/sec. and the bullet falls dead. Calculate the rise in temperature of bullet assuming that 40% of energy is used in heating the bullet. (Specific Heat Capacity of lead = 0.03 Cal/gm ^{0}C) [4]

Group 'C'

6. Answer, in brief, ***any two*** questions: [2 x 2 = 4]
   a. Why does the sky appear blue?

b. Can absolute refractive index of a medium be less than unity?
c. Why does the sun become visible before actual sunrise and after actual sunset?

7. a. Distinguish between real and virtual image. Deduce the condition for the minimum separation of a real object and its real image with converging lens. [5]

Or

What is meant by chromatic aberration of lens? Derive the condition for achromatism. [5]

b. A converging lens of 20 cm focal length is arranged co-axially with a diverging lens of focal length 8 cm. They are 8 cm apart. A point object lies on the same side of the conversing lens and very far on the axis. Find the position and nature of the final image of the distance object. [4]

Group 'D'

8. Answer, in brief, ***any two*** questions: [2 x 2 = 4]
   a. Why does the electrical conductivity of earth's atmosphere increase with altitude?
   b. A force of 40 N is acting between two charges in air. If the space between them is filled with glass of $\varepsilon_r = 8$, what will be the force?
   c. What do you mean by permittivity? If the relative permittivity of mica sheet is 6, what is the absolute permittivity? (Given $\varepsilon_0 = 8.85 \times 10^{-12}\ C^2/Nm^2$)

9. a. Show that when two conductors at different potential are connected together, a loss in energy takes place. [5]

Or

Derive an expression for the magnetic field intensity of a bar magnet at a point on end-side on position at a specified distance. [5]

b. The value of dip at a place is 45^0. If the plane of the dip circle is turned through 60^0 from meridian, what will be the apparent dip? [4]

Group 'E'

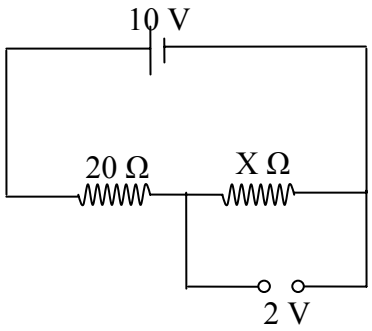
10. Answer, in brief, ***any two*** questions: [2 x 2 = 4]
    a. A current is passed through a steel wire heating to red hot. Then half of the wire is immersed in cold water. Which half of the wire will heat up more and why?
    b. Why do we prefer a potentiometer to measure emf of cell rather than a voltmeter?
    c. Can terminal p.d. be across the battery be larger than emf of it? Explain.

11. a. State Kirchhoff's Laws and prove Wheatstone Bridge principle with their help. [5]

Or

What do you understand by grouping of cells? Obtain the condition for maximum current with the mixed grouping of cells. [5]

b. In the given fig. what is the value of 'X'? [4]



Best of Luck