Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back Exam-2078, Bhadra

Program: **Diploma in Engineering All** **Full Marks: 60**

Year/Part: **I/I (New + Old)** **Pass Marks: 24**

Subject: **Engineering Physics I** **Time: 3 hrs**

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Group 'A'

Attempt All questions. **[3x6=18]**

1 State parallelogram law of vector addition. Derive the expression for magnitude and direction of resultant vector [6]

OR

What is simple harmonic motion? Show that motion of a simple pendulum is simple harmonic in nature. Derive the expression for its time period.

2. Stating the postulate of kinetic theory of gas, derive the relation $p = \frac{1}{3}\rho c^2$, where the symbols have their usual meanings. [6]

3. Define magnetic field intensity. Derive magnetic field intensity of bar magnet at a point on equatorial line. [6]

Group 'B'

Attempt Any Six questions. **[6x3=18]**

4 Define g. How does g vary with depth?

5. Define moment of inertia. Obtain the expression for rotational kinetic energy of a rigid body.

6 What is thermal conductivity? Derive formula for thermal conductivity.

7 Prove that, Cp – Cv = R where symbols have their usual meanings.

8 Derive the mirror formula $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$ for convex mirror, where symbols have their usual meanings.

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9. State and explain coulomb's law in magnetism.
10. What is magnetic hysteresis? Explain it with hysteresis curve.

Group 'C'

Attempt Any Six questions. **[6x4=24]**

11. An iron block of mass 10kg. rests on a wooden plane at 30° to the horizontal. It is found that the least force parallel to the plane which causes the block to slide up is 100N, calculate the co-efficient of sliding friction between wood and iron. ($g = 10ms^{-2}$)
12. A motorcycle rider going with a velocity of 60 km/hr around a curve with radius of 50m must lean at an angle to the vertical, find the angle at which he leans.
13. Calculate the amount of heat required to convert 1 kg of ice at - 5°c to water at 100°c. Given, specific heat capacity of ice = 2100 J/kg K, specific heat capacity of water = 4200 J/kg K and specific latent heat of fusion of ice = 3.34×10^5 J/kg.
14. A glass flask of volume 800cm^3 is just filled with mercury at 10°c. How much mercury will overflow when the temperature of system is raised to 80°c? (The coefficient of linear expansion of glass is 4×10^{-6} $^oc^{-1}$ and coefficient of cubical expansion of mercury is 1.8×10^{-5} $^oc^{-1}$.
15. The refractive index of diamond is 2.47. Calculate the speed of light in diamond.
16. Find the angle of prism if angle of minimum deviation is 38°and refractive index is 1.6.
17. A bar magnet of magnetic length 10cm has a magnetic moment of 1.2 Am^2. Calculate the magnetic intensity at a point 20cm from each pole. ($\mu_0 = 4\pi x 10^{-7} TmA^{-1}$)
18. The horizontal component of earth's magnetic field is 3.4×10^{-5} T and angle of true dip is 30°. find the total magnetic flux density of earth and the vertical component.

Good Luck!