FIRST TERMINAL EXAMINATION, OCTOBER 2013

TIME : 8.30 a.m. to 10.30 a.m. | F.Y.J.C. | DAY : Thursday

MARKS: 50 | PHYSICS | DATE : 24.10.2013

N.B. : 1. Draw neat labelled diagram wherever necessary.
2. Use of logarithmic table is allowed.

Q.I Select the most appropriate answer to each of the following questions and write it with correct alternative. (One Mark Each)

1. Choose the incorrect statement.
   a. a dimensionally correct equation may be correct
   b. a dimensionally correct equation may be incorrect.
   c. a dimensionally incorrect equation may be correct.
   d. a dimensionally incorrect equation may be incorrect.

2. What is $\hat{i} \cdot (\hat{j} \times \hat{k})$
   a. ½ b. 0
   c. 1 d. $\sqrt{2}$

3. The significant figures of following numbers 3600, 0.00538, 7860 and 42578 are
   a. 2, 3, 3, 5 b. 4, 3, 4, 5
   c. 2, 5, 4, 5 d. 4, 3, 3, 5

4. If the component of $\vec{A}$ in the direction of $\vec{B}$ is zero then $\vec{A}$ and $\vec{B}$ are
   a. coplanar vectors
   b. parallel to each other
   c. antiparallel to each other
   d. perpendicular to each other

5. Two steel marbles of radii R and R/3 are released in highly version liquid. The ratio of terminal velocity of larger marble to that of smaller is -
   a. 9 b. 3
   c. 1 d. ⅑

Q.2 Attempt any four.

1. Find dimensionally, relation of periodic time T with mass, force and distance. **(2m)**
2. If $|\vec{a}+\vec{b}| = |\vec{a}-\vec{b}|$ Show that $\vec{a} \perp \vec{b}$ **(2m)**
3. If $\vec{A} = \vec{i} + 2\vec{j}$ and $\vec{B} = 3\vec{i} - 5\vec{k}$. Find $\vec{A} \times \vec{B}$ **(2m)**
4. Explain effect of gravity on fluid pressure. **(2m)**
5. Find force required to move a flat glass plate of surface area $10cm^2$, **(2m)**

with a velocity of 1cm/s over a surface of glycerine 1mm thick, if the coefficient of viscosity of glycerine is 20 poise.

6. Rain drop of radius 0.2 mm falling with velocity of 2m/s. If coefficient of viscosity of air is 1.8×10^{-4} NS/m^2, determine viscous force acting on drop.

Q.3 Attempt any four.

1. State law of parallelogram of vectors, hence find the expression for magnitude of resultant vector. **(3m)**
2. The mass of body was measured by a beam balance and following five readings were obtained: 4.07 gram, 4.03 gram, 3.92 gram 4.00 gram and 3.98 gram. Find most probable value of mass and the percentage error in the measurement. **(3m)**
3. If $\vec{P} = 7\vec{i} + 5\vec{j} + 2\vec{k}$ and $\vec{Q} = 2\vec{i} - 3\vec{j} + 5\vec{k}$, Find $(\vec{P} + \vec{Q}) \cdot (\vec{P} - \vec{Q})$
4. State the characteristics of transverse wave. (any six) **(3m)**
5. State Bernoullis principle. Explain its use in venturimeter. **(3m)**
6. Water is filled in circular flask having area $2m^2$ upto a height of 30 cm. **(3m)** If atmospheric pressure is 1.01×10^5 pascal, then find total force exerted by water on the bottom.

SECTION - II

Q.4 Select the most appropriate answer to each of the following questions and write it with correct alternative. **(5)**

1. A thin prism of 3° gives a deviation of 1.65°. The R.I. of the material of prism will be .....
   a. 1.53 b. 1.56
   c. 1.55 d. 1.54

2. The net angular dispersion in the achromatic combination of prism is .....
   a. $\delta(w - w^1)$ b. Zero
   c. $\delta\left(1 - \frac{w}{w^1}\right)$ d. $\delta\left(1 - \frac{w^1}{w}\right)$

3. Which is not unit of magnetic induction .....
   a. Wb/m^2 b. tesla
   c. N/Am d. Nm/A

4. The capacity of an accumulator is measured in .....
   a. ampere - hour b. ampere - kilogram
   c. ampere ohm d. Newton hour

5. The ratio of focal length and radius of curvature of spherical mirror is .....
   a. 1 : 2 b. 2 : 1

Q.5 Attempt Any four. **(8)**

1. Define total internal reflection. What are the conditions for total internal reflection.
2. Write uses of thermistor.
3. A straight wire carries a current of 5A. Calculate the magnetic induction at a point 10cm away from the conducting wire.
   ($\mu o = 4\pi \times 10^{-7}$ wb /AM)
4. A constantan wire of length 50cm & 0.4 mm diameter is used in making a resistor. If the resistivity of constantan is 5×10^{-7} Ωm. Calculate the value of resistor.
5. Draw a neat labelled diagram showing formation of secondary rainbow.
6. A ray of light is incident on the surface of water at an angle of incidence of 65°. The ray is deviated through 20° towards the normal when it enters the water. Calculate R.I. of water.

Q.6 Attempt Any four. **(12)**

1. A refrigerator has power rating of 250. watt. which operates for 8 hours a day. Calculate the cost of electrical energy to operate it for a month of 30 days. The cost of electrical energy is Rs. 6 per kw/hr. (Assuming that there is no load shading or power cut)
2. Obtain an expression for the magnetic induction at the centre of a circular coil carrying a current.
3. Derive mirror equation for spherical mirror system.
4. The refractive indices of the material of prism for red & violet colours are 1.70 & 1.73 respectively. Determine the angular dispersion & dispersive power if refracting angle of prism is 6°.
5. Define e.m.f. of the cell. Explain application of ohm's law to a complete circuit.
6. The R.I, of the material of a prism of refracting angle 75° is $\sqrt{2}$. Find the minimum angle at which a ray of light must be incident on one face so that it may just emerge from the other refracting face.