B. N. Bandodkar College of Science, Thane
Junior College
F.Y.J.C. 1st Term Examination, October 2014
Subject – Physics I and II

Day: Saturday **Time: 11.00 am to 01.00 pm**
Date: 11/10/2014 **Max. Marks: 50**

Note: 1) Figures to the right indicate full marks.
2) Draw neat labeled diagram wherever necessary.
3) Use of logarithmic table is allowed.

Section – I

Q.1 **Attempt *any Four:*** **08**

1) Using dimensional analysis, derive relation for force F with mass m, speed v and radius r.
2) The radius of a nucleus of mass number 'A' is given by $R = 1.3 \times 10^{-16} \times A^{1/3}$. Find the order of magnitude of radius for a nucleus with A = 216
3) Explain triangle law of vector addition
4) Explain origin of friction.
5) Obtain viscous force acting on the rain drop of radius 0.15mm falling with velocity of 4 m/s. The coefficient of viscosity of air is 1.8×10^{-4} Ns/m^2.
6) A 40 kg metal block is placed on a horizontal surface. The block just begins to slide when horizontal force of 200N is applied to it. Calculate the coefficient of static friction.

Q.2 **Attempt *any Four:*** **12**

1) Explain different types of errors in measurements.
2) State and explain parallelogram law of vector addition and determine magnitude of resultant.
3) Find area of parallelogram with adjacent side formed by $\vec{A}$ *and* $\vec{B}$ where

$$\vec{A} = 2\hat{\imath} + 3\hat{\jmath} + 4\hat{k} \quad \text{and} \quad \vec{B} = 3\hat{\imath} + 2\hat{\jmath} - 2\hat{k}$$

4) Find pressure energy per kg, Kinetic energy per kg, Potential energy per kg and total energy per kg of water which flows through tube, where pressure is 4×10^5 N/m^2 at the point where the velocity is 20 cm/s and height is 20 cm above the ground level.
5) A water tank has a hole at a distance of 3 m from free surface of water through hole. If the radius of the hole is 1 mm. What is the rate of flow of Water?

Q.3 **Select and write the most appropriate answer from the given alternatives for each sub question:** **05**

1) The dimensional formula for electrical resistance is
a) $[M^1L^2T^{-3}A^{-1}]$ b) $[M^1L^2T^{-2}A^{-2}]$ c) $[M^1L^2T^{-3}A^{-2}]$ d) $[M^1L^1T^{-3}A^{-2}]$
2) If $\vec{A} = \hat{\imath} + \hat{\jmath} + 2\hat{k}$ is perpendicular to $\vec{B} = 2\hat{\imath} + y\hat{\jmath} - 3\hat{k}$ then y =?
a) 2 b) 4 c) 8 d) 12
3) The physical quantity having the same unit in all the system of units is _____
a) Length b) time c) mass d) temperature
4) Water flowing through pipe of radius 1.5 cm with average velocity 15 cm/s given $\eta = 10^{-3}$ kg/ms, $\varrho = 10^3$ kg/m^3 then nature of flow is
a) turbulent b) streamline c) major d) minor
5) If acceleration due to gravity is increased then mercury height of barometer _____
a) increases b) decreases c) remain constant d) not changed by large value
6) What is the force required to move body of mass 60 kg on a surface of coefficient of static friction of 0.54.
a) 30 N b) 32.7 N c) 32.40 N d) 30.70 N

Section – II

Q.4 **Select and write the most appropriate answer from the given alternatives for each sub question:** **05**

1) The capacity of an accumulator is measured in _____

a) ampere hour b) ohm c) tesla d) volt

2) The magnetic flux per unit area is

a) magnetic strength b) magnetic induction

c) magnetic moment d) electric intensity

3) Deflection of light rays in different direction when ray of light is incident on very small object is _____

a) dispersion of light b) scattering of light

c) refraction of light d) partial refraction of light

4) For refracting angle 10^0 the refractive indices for red and violet colour of prism are 1.64 and 1.66 then its angular dispersion is

a) 0.2 b) 0.4 c) 0.5 d) 0.1

5) Resistance of mercury falls to 0 Ω at

a) -273^0C b) 0^0C c) 4.2 k d) 4.2 F

Q.5 **Attempt *any Four:*** **08**

1) Write colour code for following resistors.

a) 10 k Ω ± 10% b) 47 Ω

2) A ray of light is incident on the surface of glass at an angle of incidence of 60^0. The ray is deviated through 25^0 towards normal when it enters glass. Calculate refractive index of glass.

3) An object is placed at a distance of 6 cm from a concave mirror having radius of curvature 30 cm. Find the position of the image.

4) Write a short note on rainbow.

5) A straight wire carries a current of 5A. Calculate the magnitude of magnetic induction at a point 10 cm away from the conducting wire. ($\mu_0 = 4\pi \times 10^{-7}\ wb/Am$)

6) Write equivalence between current carrying circular coil and magnetic dipole.

Q.6 **Attempt *any Four*:** **12**

1) Explain refraction at a single curved surface and obtain relation among u, v and R.

2) Explain critical angle with neat diagram and derive its formula.

3) Explain application of Ohm's law to a complete circuit.

4) A silver wire has resistance of 2.1 Ω at 27.5°C. If temperature coefficient of resistance silver is $3.94 \times 10^{-3}/^0$C, find the resistance of silver wire at 100^0C.

5) The refractive indices of the material of prism for red and violet colours are 1.71 and 1.74 respectively. Determine the angular dispersion and dispersive power of prism if its refracting angle is 6^0.

6) Calculate the magnetic field of induction, due to circular coil of 370 turns and radius 0.05 m carrying a current of 5A, at the center of the coil. $\left(\frac{\mu_0}{4\pi} = 10^{-7}\ wb/Am\right)$.

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