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Total No. of Pages : 02

Total No. of Questions : 09

B.Sc (Hons) Aircraft Maintenance (2018 Batch) (Sem.-1)

PHYSICS

Subject Code : BSCARM-103-18

Paper ID : [75634]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly : (2×10=20)

- a) Define the cross product of two vectors.
- b) Show that the derivative of a vector of constant direction is parallel to that vector.
- c) Define the term 'central force' and show that it is conservative in nature.
- d) If no torque acts on a body, will its angular velocity remain conserved.
- e) Name the periodic motion which is not oscillatory.
- f) What is the phase relationship between displacement, velocity and acceleration in simple harmonic motion?
- g) State Kepler's laws of planetary motion.
- h) Two photons approach each other, what is their relative velocity.
- i) What is the difference between linear momentum and angular momentum?
- j) State the fundamental postulates of special theory of relativity.

SECTION-B

2. Derive the following expression for the elastic constant : $E = 2G(1 + \mu)$ (5)
3. a) State and explain the law of conservation of angular momentum. Illustrate with examples. (3)
b) Distinguish between inertial and non-inertial frames of reference. Give one example of each. Is earth an inertial frame? (2)
4. a) A particle moves under a central force. Show that its orbit lies in a plane. (3)
b) If the mass of Sun is 2×10^{30} kg, distance of earth from the Sun is 1.5×10^{11} m and period of revolution of the former around the latter is 365.3 days, find the value of G. (2)
5. Show that for a particle executing simple harmonic motion the average value of kinetic and potential energy is the same and each is equal to half the total energy. (5)
6. Starting from velocity addition formula show that it is in conformity with principle of constancy of speed of light. (5)

SECTION-C

7. a) Define and explain various types of strain. What is Poisson's ratio? Explain its use in generalized Hooke's law. (4)
b) Define modulus of elasticity, modulus of rigidity and bulk modulus, and establish a relationship between them. (6)
8. a) Derive the law of conservation of linear momentum from Newton's laws of motion. (5)
b) Show that if total momentum of a system of particles is constant. Then its centre of mass is either at rest or is moving with constant velocity. (5)
9. a) Two space-crafts A and B are moving away from the earth in the same direction with speed $0.8c$ and $0.6c$, respectively. Find the velocity of B with respect to A. (4)
b) With what velocity should a rocket move so that every year spent on it corresponds to 4 years on earth? (3)
c) A rod has a length of 2 m. Find its length when carried in a rocket with a speed of $2.7 \times 10^8 \text{ ms}^{-1}$. (3)