No. of Printed Pages : 3

BAS-001

B.Tech. AEROSPACE ENGINEERING (BTAE)

Term-End Examination

June, 2018

00073

BAS-001 : APPLIED PHYSICS

Time : 3 hours *Maximum Marks : 70*

Note : *Answer any **seven** questions. All questions carry equal marks. Use of scientific calculator is permitted. All symbols and notations carry usual meaning.*

1. Derive the displacement and velocity of a particle executing a simple harmonic motion, as a function of time. *10*

2. The co-efficient of static friction between a block of mass 'm' and an incline is $\mu_s = 0{\cdot}3$.

   (a) What can be the maximum angle θ of the inclined plane with the horizontal so that the block does not slip on the plane ?

   (b) If the inclined plane makes an angle $\theta/2$ with the horizontal, find the frictional force on the block. *10*

3. Two travelling waves of equal amplitudes and equal frequencies move in opposite directions along a string. They interfere to produce a standing wave having the equation

$$y = A \cos kx \sin \omega t$$

in which A = 1·0 mm, k = 1·57 cm^{-1} and $\omega = 78{\cdot}5\ s^{-1}$.

(a) Find the velocity of the compound travelling waves.

(b) Find the node closest to the origin in the region $x > 0$.

(c) Find the antinode closest to the origin in the region $x > 0$.

(d) Find the amplitude of the particle at $x = 2{\cdot}33$ cm. *10*

4. (a) Explain the Fraunhofer type of diffraction produced by a narrow single slit of width 'a' and illuminated by a monochromatic light of wavelength 'λ'. Also deduce the positions of maxima and minima. *5*

(b) What is a progressive wave ? Find the equation of a plane progressive wave. Also deduce the relation between phase difference and path difference. *5*

5. (a) State Bohr's fundamental postulates to explain the spectra of hydrogen atom. Deduce an expression for the energy of hydrogen atom in n^{th} state. 5

(b) Explain (i) Cut-off potential, (ii) Cut-off frequency, and (iii) Cut-off wavelength with respect to photoelectric effect. 5

6. (a) Derive the relation between stopping potential and threshold frequency in photoelectric effect. 5

(b) A mass M is attached to a spring which oscillates with a period of 4 seconds. If the mass is increased by 2 kg, the period increases by 2 seconds. Find the initial mass M, assuming that Hooke's law is obeyed. 5

7. Discuss the phenomenon of interference of thin films, in detail. 10

8. Explain the construction and working of a Helium – Neon Laser. 10

9. Describe the Michelson-Morley experiment for detecting relative motion of matter. 10