00641

B.Tech. AEROSPACE ENGINEERING (BTAE)

Term-End Examination

June, 2019

BAS-001 : APPLIED PHYSICS

Time : 3 hours *Maximum Marks : 70*

Note : *(i) Question 1 is **compulsory**.*

*(ii) Attempt **any five** questions from Q. 2 to Q. 9.*

(iii) Assume missing data if any.

(iv) Use of scientific calculator is permitted.

1. (a) Define periodic motion and frequency. 3

(b) Equation of a particle executing SHM is $y = 5 \sin 20\pi t$, where y is in cm and t in sec. Calculate maximum speed and acceleration of a particle. 3

(c) Define wavelength and phase. 3

(d) The equation of a progressive wave is given by $y = 5 \sin (10\ \pi t - 0.1\pi x)$ when x and y are in metre and 't' is in sec. Calculate (i) Amplitude (ii) Frequency (iii) Time period and velocity of the wave. 3

(e) Define beats. 3

(f) A parallel beam of light ($\lambda = 5890$ Å) is incident on a thin glass plate (μ=1.5) such that the angle of refraction is 60°. Calculate the smallest thickness of the plate which will appear dark by reflection. 3

(g) In a Newton's rings experiment, the diameter of the 5^{th} ring was 0.336 cm and the diameter of the 15^{th} ring = 0.590 cm. Find the radius of curvature of the plano-convex lens, if the wavelength of light used is 5890 Å. 3

(h) How many orders will be visible if the wavelength of light is 5000 Å and the number of lines per inch on the grating is 2620 ? 3

(i) Define Malus law. 3

(j) Define Heisenberg uncertainity principle. 3

(k) An electron has a speed of 600 m/s with an accuracy of 0.005%. Calculate the certainity with which we can locate the position of electron $h = 6.6 \times 10^{-34}$ Js and $m = 9.1 \times 10^{31}$ kg. 3

(l) Define Zeemen & Paschen-Back effect. 3

(m) Define induced absorption & population inversion. 3

(n) A rod of 1 metre long is moving along its length with a velocity of 0.6c. Calculate its length as it appears to an observer in the stationary reference frame of the earth. 3

(o) The mean life time of π meson is 2×10^{-8}s. Calculate mean life of meson moving with a velocity of 0.8c. 3

2. Obtain the differential equation of motion in the case of simple pendulum. Also find the frequency and period of motion. 5

3. Derive an expression for the velocity of transverse wave in a stretched string. 5

4. Prove that excess pressure 'P' and particle velocity 'u' in a plane of longitudinal wave in a medium of volume elasticity 'ϵ' are related by $P=\frac{Eu}{v}$, where 'v' is the speed of wave. 5

5. Derive an expression for the interference due to reflected light and what are the conditions required to achieve bright and dark fringes. 5

6. Explain in detail the construction and working of Ruby Laser with a neat diagram. 5

7. Describe briefly the experiment of G.P. Thomson on the diffraction of electrons and explain briefly the results obtained. 5

8. Discuss in detail length contraction and time dealation. 5

9. A single electron revolves around a stationary nucleus of charge $+Ze$ where 'Z' is a constant and 'e' is the magnitude of the electronic charge. It requires 47.2 eV to excite the electron from second Bohr orbit to the third Bohr orbit. Find. 5
   (a) The value of 'Z'.
   (b) The energy required to excite the electron from third to fourth Bohr orbit.
   (c) The wavelength of electromagnetic radiation required to remove the electron from first Bohr's orbit to infinity.