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BAS-001

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B.TECH. (AEROSPACE ENGINEERING) (BTAE)

Term-End Examination

June, 2014

BAS-001 : APPLIED PHYSICS

Time : 3 hours *Maximum Marks : 70*

*Note : Question No. 1 is **compulsory**. Attempt **any five** questions from Question 2 to Question 9.*

1. (a) Two waves of amplitude 3 mm and 4 mm respectively travel in the same medium and in the same direction. If the phase difference between these waves at a point in their path is $\pi/2$, what will be the resultant amplitude at that point due to these waves ? **15x3=45**

   (b) What is the difference between Fresnel and Fraunhofer diffraction ?

   (c) Does the diffraction occure without interference and vice-versa ?

   (d) Find the ratio of minimum to maximum wavelength of radiation emitted by electron in ground state of Bohr's hydrogen atom.

   (e) The wavelength of the first member of the Balmer-series in hydrogen spectrum is $6563\,\mathring{A}$, find the wavelength of the second member of the Balmer-series.

(f) Fringes of equal thickness are observed in a thin glass wedge of refractive index 1.52. The fringe spacing is 1mm and wavelength of light is 5893 $\mathring{A}$. Calculate the angle of the wedge in seconds of an arc.

(g) Explain the terms plane of polarisation and plane of vibration.

(h) Distinguish between group velocity and wave velocity and derive an equation relating them.

(i) Give an account of various quantum numbers associated with vector atom model.

(j) Explain the colours of thin films.

(k) The rest mass of an electron is 9.1×10^{-31}kg. What will be its mass if it were moving with $\frac{4}{5}$th the speed of light ?

(l) What is meant by resonance ? Give one example.

(m) What are Beats ? What are the conditions of beats ?

(n) Explain with examples the transverse waves and longitudinal waves.

(o) Find the energy of the neutron in units of electron volt whose de-broglie wavelength is 1 $\mathring{A}$. Given,
mass of the neutron $= 1.674 \times 10^{-27}$kg
Plank's constant $h = 6.60 \times 10^{-34}$ Joule/sec.

2. What are matter waves ? Show that the wavelength 'λ' associated with a particle of mass 'm' and kinetic energy 'E' is given by, $\lambda = \frac{h}{\sqrt{2mE}}$, where, h is plank's constant. 5

3. In Newton's ring experiment, the diameters of the 4^{th} and 12^{th} dark rings are 0.40 cm and 0.70 cm respectively. Find the diameter of the 20^{th} dark ring. 5

4. What is meant by plane polarized, circularly polarized and elliptically polarized light ? 5

5. Deduce an expression for the intensity at a point in the region of superposition of two waves of same periods and wavelength. On the basis of this result, establish the necessity of two coherent sources for the production of observable interference pattern. 5

6. 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

7. If $x = a\cos\omega t + b\sin\omega t$, show that it represents simple harmonic motion. Also, find the amplitude of S.H.M. 5

8. 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

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