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BAS-001

00371

B.TECH. (AEROSPACE ENGINEERING) (BTAE)

Term-End Examination

December, 2013

BAS-001 : APPLIED PHYSICS

Time : 3 hours *Maximum Marks : 70*

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

15x3=45

1. (a) A simple harmonic oscillation is represented by the equation, $y = 0.2 \sin (50\pi t + 1.57)$; where '$y$' and 't' are in metres and seconds respectively. Write down its amplitude, angular frequency, time-period and initial phase.

   (b) If the length of a simple pendulum is increased by 4%, what will be the percentage change in its time period ?

   (c) What is the difference between interference and diffraction of light ?

   (d) Prove that if light is incident at the polarising angle, reflected and refracted rays are mutually perpendicular to each other.

   (e) What is the angular momentum of an electron in Bohr's Hydrogen atom whose energy is -3.4eV ?

   (f) Explain "general assumptions" of Bohr's model of Hydrogen atom.

(g) What do you understand by dual nature of matter? Explain De-Broglie hypothesis.

(h) Light of wavelength 6000Å falls normally on a thin wedge shaped film of refractive index 1.4, forming fringes that are 2mm apart. Find the angle of wedge ?

(i) Explain the Fraunhofer diffraction due to a single slit.

(j) Explain the difference between Beats and Interference.

(k) What is meant by fringe-width ? Write the formula for the fringe-width in young's experiment of interference of light.

(l) Define and explain with examples, free, forced and damped oscillations.

(m) Explain resonance, excitation and ionisation potential in hydrogen atom.

(n) Write main conditions for well-defined and observable interference of light waves.

(o) The wavelength of the first member of the Balmer series in hydrogen spectrum is 6563Å. Calculate the wavelength of the first and second members of the Lyman-series in the same spectrum.

2. A particle of rest mass 'm_0' has a kinetic energy 'K'. Show that its De-Broglie wavelength is given by, 5

$$\lambda = \frac{hC}{\sqrt{K\left(K+2m_0C^2\right)}}$$

3. State Heisenberg's uncertainty principle. Obtain an expression relating uncertainty in position and uncertainty in momentum. 5

4. Light containing two wavelengths λ_1 and λ_2 falls normally on a plano-convex lens of radius of curvature 'R' testing on a glass-plate. If the n^{th} dark ring due to 'λ_1', coincides with the $(n+1)^{th}$ dark ring due to λ_2, calculate the radius of the n^{th} dark ring. 5

5. Describe and explain the formation of Newton's rings in reflected monochromatic light. Explain briefly why Newton's rings are circular? 5

6. Define Coherent sources. Explain why the resultant intensity at any point is not just the sum of intensities due to separate disturbances? 5

7. State Pauli's exclusion principle and discuss its genesis. Explain the periodic classification of elements with the help of this principle. 5

8. State the principle of superposition. Give the mathematical theory of interference between two waves of amplitude 'a_1' and 'a_2 with phase difference ϕ. 5

9. Describe the various series of lines in the spectrum of atomic hydrogen and show how they have been explained by Bohr's theory ? 5