DTU/11/0719

B.Tech. [Group A & B]

MID SEMESTER EXAMINATION

September-2011

AP-103 APPLIED PHYSICS-I

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note :	Answer **ALL** questions.
	Assume suitable missing data, if any.

1   A beam of μ-mesons, produced at a height of 20 km in the earth's atmosphere, travels downwards with a velocity of 0.99c. If 99% of the original mesons decay before reaching the earth's surface, find the mean life time of the μ-mesons. 4.78×10^{-4} **4**

2[a] Calculate the length and orientation of a rod of length 5m in a frame of reference which is moving with a velocity 0.6c in a direction making an angle of 30° with the rod.   3.38, 42.36°   **2**

 [b] An electron ($m_0 = 0.511$ MeV/c^2) and a photon both have momenta of 2MeV/c. Find the total energy of each.   2.06, 2   **2**

3[a] In the Newton's rings arrangement if the incident light consists of two wavelengths 400 nm and 400.2 nm. Calculate the distance (from the point of contact) at which rings will disappear. Assume that the radius of curvature of the curved surface is 400 cm.   5.66 cm   **2**

 [b] In an arrangement of double slit experiment, the slits are illuminated by light of wavelength 600 nm. Find the distance of the first point on the screen from the central maximum where the intensity is 75% of central maxima.

2.033×10^{-10}

- S_1 (Source)

- S_2 (Source)

S
C
R
E
E
N

(The distance between the sources in 0.25 cm & screen is 120 cm apart from source).   **2**

$3.91 \times b^6$

4[a] An electron is accelerated to an energy of 2GeV by an electron synchrotron. What is the ratio of the electron's mass to its rest mass. **2**

[b] A particle has a velocity $u' = 3\hat{i} + 4\hat{j} + 12\hat{k} \ m/sec$ in a coordinate system moving with velocity 0.8c relative to laboratory along positive direction of x-axis. Find u in laboratory frame. $24/4,12$ **3**

5 White light, with a uniform intensity across the visible wavelength range of 400 to 690 nm, is perpendicularly incident on a water film, of index of refraction $n_2 = 1.33$ and thickness L= 320 nm, that is suspended in air. At what wavelength λ is the light reflected by the film brightest to an observer. **3**

$425.6 nm$

$2\mu t = \cos r$

$2\mu t$