* J B - 3 0 9 8 *

JB-3098

Second Year B. Sc. (Sem. III) Examination

March/April – 2013

Applied Physics : Paper - V

(Modern Physics) (New Course)

Time : Hours] [Total Marks : **50**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **S. Y. B. Sc. (Sem. III)**

Name of the Subject :

☛ **Applied Physics - V** (New Course)

☛ Subject Code No. : **3 0 9 8** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) Question No. 1 is compulsory.

(3) All questions carry equal marks.

(4) Figures to right indicates full marks.

(5) Each question in question - 1 carry 2 marks.

1 (i) What do you mean by an inertial frame of reference ? **8**
(ii) Write down Galilean transformation equations.
(iii) What is a perfect black body ?
(iv) State Hiesenberg's uncertainty principle.

2 (a) Express the relativistic expression of second law of motion terms of rest mass and velocity of a particle. **8**

(b) Deduce Einstein's mass-energy equivalence relation. **6**

OR

2 (a) Derive relativistic formula for kinetic energy and show that it reduces to the usual expression $\frac{1}{2}mv^2$ when $\frac{v}{c} << 1$ where m and v is mass and velocity of a body respectively. **9**

(b) Two photons approach each other, what is their relative velocity ? **5**

3 (a) What are the failures of classical mechanics. ? Explain in detail. **10**

(b) If the wass of cavity emites 10^5 protons each having frequency 10^4 Hz, find the energy of (emitted) photons. **4**

OR

3 (a) What is a black body ? Explain black body radiation. **10**

(b) Calculate the energy of photon of television waves with frequency 200 MhZ. **4**

4 (a) Explain Compton effect. **9**

(b) X-rays of wavelength 10.0 pm are scattered from a target (i) Find the wavelength of the X-rays scattered throught 45^0. (ii) Find the maximum wavelength present in the scattered X-rays. **5**

OR

4 (a) Write a short note on Davison - Germer experiment. **9**

(b) Derive Time-Energy uncertainty equation. **5**