Oct-2014

Seat Number

0507

कदंब - 065

PHYSICS PAPER - I : PHY-241
Modern Physics
(New) (24125)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All question are compulsory and carry equal marks.
5. Figures to the right indicate full marks.
6. Use of logarithmic table or electronic calculator is allowed.

1. Attempt **any eight** of the following. **8**

i) LASER is .....
   a) Highly monochromatic b) Chromatic
   c) Both (a & b) d) None of the above

ii) Energy of photon can be expressed by the relation .....
   a) $E = hc$ b) $E = h\nu$
   c) $E = \frac{1}{2}mv^2$ d) $E = mc^2$

iii) Matter waves are associated with .....
   a) Fast moving cricket ball b) Fast moving electron
   c) Both (a & b) d) None of the above

iv) Total number of circular orbits for any energy level equal to .....
   a) 1 b) 2
   c) 3 d) 4

v) Efficiency of solar cell must be .....
   a) Large b) Medium
   c) Low d) None of the above

vi) Expression for group velocity is .....

a) $\frac{w}{k}$ b) $\frac{dw}{dk}$

c) $\frac{dw}{d\lambda}$ d) None of the above

vii) Photoelectric effect proves the

a) Corpuscular nature b) Wave nature

c) Dual nature d) None of the above

viii) Uncertainty relation was established by .....

a) Newton b) Max Planck

c) De-Broglie d) Heisenberg

ix) Bohr's atomic model is.....

a) Most stable b) Unstable

c) Both (a & b) d) None of the above

x) Principal quantum number gives.....

a) Total no. of orbits

b) Total no. of circular orbits

c) Total no. of elliptical orbits

d) None of the above

2. Attempt **any four** of the following. 8

a) State the principle of photovoltaic conversion of solar energy.

b) Give the brief account of wave particle duality.

c) State the characteristics of LASER.

d) What do you mean by Terrestrial and Extra-Terrestrial radiations ?

e) Explain the degree of Monochromaticity.

f) State the relations between phase velocity and group velocity with reference to k & λ.

3. Attempt **any two** of the following. 8

a) Explain why the solar energy is the best option ?

b) Describe I – V characteristics of solar cell.

c) Explain Bohr's postulates.

4. a) Attempt **any two** of the following. **6**

i) Velocity of ocean waves is $\sqrt{\frac{9\lambda}{2\pi}}$. Hence find group velocity.

ii) Explain the principle of photovoltaic conversion of solar energy.

iii) Write a short note on optical pumping.

b) State conventional and nonconventional sources of energy. **2**

5. a) Attempt **any one** of the following. **6**

i) Using uncertainty principle, prove that free electron can not exists inside the nucleus, assuming that maximum kinetic energy of the electron emitted by radioactive nuclei is about 4 Mev.

ii) Describe He-Ne LASER.

b) Calculate de-Broglie wavelength of an electron whose kinetic energy is equal to 10 ev. **2**

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