Total No. of printed pages = 6

Sc-204/AP-II/2nd Sem/2012/N

APPLIED PHYSICS – II

Full Marks – 70

Pass Marks – 21

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer question No.1 and any *five* from the rest.

1. A. Fill in the gaps with appropriate words : 1×5=5

(a) The Kilowatt-hour is the practical unit of ..... .

(b) The conductivity of semiconductor increases on ..... .

(c) The kinetic energy of a photoelectrons emitted depends on the ..... of the incident light.

[Turn over

(d) The focal length of a plane mirror is ..... .

(e) The particle of light is called ..... .

B. Select the correct answer in each of the following : $1 \times 5 = 5$

(a) The S.I unit of electric resistance is —

(i) Joule (ii) Ampere

(iii) Volt (iv) Ohm

(b) Which of the following mirror always produces virtual image of same size of that object ?

(i) convex (ii) concave

(iii) plane (iv) parabolic

(c) The angle between geographical meridian and magnetic meridian at any place is called —

(i) dip

(ii) declination

(iii) angle of bending

(iv) None of the above.

(d) Three capacitors of capacitance 2 farad when connected in parallel gives the equivalent capacitance of —

(i) 2 farad (ii) 4 farad

(iii) 6 farad (iv) 8 farad.

(e) X consists of —

(i) photon

(ii) positron

(iii) electron

(iv) positively charged particles.

2. (a) Explain with a neat diagram the critical angle and hence total internal reflection of light. State the condition for total internal reflection. 3+2=5

(b) Define power of a lens. Determine the power of a convex lens of focal length 20 cm in dioptre. 1+2=3

(c) An object 10 cm long is placed from a convex lens of focal length 10 cm. Find position, nature and size of the image. 4

3. (a) State and explain Coulomb's law of electrostatics with mathematical expression. Define Coulomb of charge. 2+1=3

(b) What do you mean by electrostatic potential? Obtain an expression to calculate the electrostatic potential at any point due to a point charge. 1+4=5

(c) The refracting angle of a prism is 60° and the angle of minimum deviation of a ray through the prism is 40°. Calculate the refractive index of the prism and angle of incidence. 4

4. (a) Distinguish between primary cell and secondary cell. 3

(b) Define local action and polarization defect of simple voltaic cell and explain how it can be removed. 2+2=4

(c) Obtain an expression to calculate the equivalent resistance when a number of resistances are connected in parallel. 3

(d) State Ohm's law and hence define resistance. 2

5. (a) State and explain Faraday's law of electromagnetic induction. 4

(b) What is earth magnetism ? Mention the element of earth's magnetism. 3

(c) Define magnetic intensity and magnetic lines of force. 3

(d) What do you mean by electroplating ? 2

6. (a) What do you mean by photoelectric effect ? Deduce Einstein's photoelectric equation. What is work function of metal ?

1+3+1=5

(b) What is thermion ? Explain how a diode can be used as a rectifier ? 1+3=4

(c) Define mass defect and binding energy. 3

7. (a) What is X-ray ? Mention some uses of X-ray in medical and technical field. 4

(b) State P-type and N-type semiconductor with at least one example of each. 3

(c) What is radioactivity ? State some properties of alpha particle. 3

(d) The work function of a metal is 3.3 e.v. Calculate the threshold frequency for it. Given $h = 6.6 \times 10^{-34}$ Js. 2