Total No. of printed pages = 6

Sc-204/AP-II/2nd Sem/2013/M

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. Choose the correct answer in each of the following : 1×5=5

(a) Two magnetic lines of forces never intersect each other. (True / False)

(b) A concave mirror always produces a virtual image of an object wherever the object is placed in front of it. (True / False)

(c) Henry is the S.I unit of inductance. (True / False)

(d) The layer of neutral hydrogen formed around the copper plate of a simple voltaic cell is known as local action defect. (True / False)

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(e) A rectifier converts a.c voltage to d.c voltage. (True / False)

B. Select the correct answer in each of the following : 1×5=5

(a) The S.I unit of electric current is –

(i) Joule

(ii) Ampere

(iii) Volt

(iv) Ohm.

(b) Lenz's law helps us to know –

(i) The motion of a magnet

(ii) The force exerted in a coil

(iii) The direction of induced e.m.f

(iv) Whether the current is a.c or d.c.

(c) Einstein's photo electric effect proves that –

(i) Light waves are transverse in nature

(ii) Velocity of light is constant

(iii) Light is quantum in nature

(iv) Light waves are e.m waves.

(d) Three capacitors of capacitances 2 μF each when connected in parallel gives the equivalent capacitance of –

(i) 2 μF

(ii) 0.5 μF

(iii) 4 μF

(iv) 6 μF

(e) A P-type semiconductor has –

(i) more electrons than hole

(ii) holes more than electrons

(iii) same numbers of holes and electrons

(iv) None of the above.

2. (a) What is an optical image ? How do you differentiate a real image from a virtual image ? 1+3=4

(b) Deduce the prism formula $\mu = \frac{\sin\left(\frac{A+\delta_m}{2}\right)}{\sin\left(\frac{A}{2}\right)}$

where the symbols has usual meaning. 4

(c) Find the position, nature and size of the image formed when an object of height 10 cm is placed 30 cm in front of a converging mirror of radius of curvature of 40 cm. 4

3. (a) Deduce a mathematical expression to determine the electrostatic potential at any point due to a point charge of magnitude + q. 4

(b) State and explain Coulomb's law of electrostatic force between two point charges with mathematical expression. Define coulomb of charge. 2+1=3

(c) Define magnetic lines of force. State some of its properties. 1+2=3

(d) What do you mean by terrestrial magnetism? Name the elements of terrestrial magnet. 2

4. (a) Define electric cell. Explain the theory of action of a simple voltaic cell with its chemical reactions. 1+4=5

(b) Deduce an expression for intensity due to short bar magnet at end on position. 4

(c) Three resistances 2, 3 and 4 ohms are connected in parallel and a potential difference of 12 volts is applied across the extreme ends. Calculate the current passing through each resistances. 3

5. (a) What is electromagnetic induction ? State laws of electromagnetic induction. 4

(b) What is capacity of a conductor ? Show that the capacity of a spherical conductor is numerically equal to its radius in C.G.S system. 3

(c) State Kirchhoff's law regarding current and voltage in a circuit. 4

(d) What is electrolysis ? 1

6. (a) What is photo emission ? Deduce Einstein's photoelectric equation. 1+2=3

(b) What are the different components of a diode ? Explain the working of a diode with circuit diagram. 1+3=4

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

(d) State Joule's law of heating ? 2

7. (a) What is Radioactivity ? Mention some uses of X-ray in medical and technical field. 1+2=3

(b) State Intrinsic and Extrinsic semiconductor with at least one example of each. 3

(c) State some properties of alpha, beta and gamma particles. 3

(d) Express 1 a. m. u (atomic mass unit) in M.eV (million electron volt). 3