E-443 (H/E)

Simplifying Test P

# PHYSICS 2016

Time : 3 Hours |          Class : 12th          | M. M. : 75

Instructions -

(i)     All questions are compulsory. Internal options are given in each question from question nos. 5 to 18.

(ii)    Each question from question nos. 1 to 4 carry 5 marks and each subquestion carries 1 mark.

(iii)   Each question from question nos. 5 to 8 carry 2 marks and word limit for each answer is approx 30 words.

(iv)    Each quesdtion from question nos. 9 to 13 carry 4 marks and word limit for each answer is approx 75 words.

(v)     Each question from question nos. 14 to 16 carry 5 marks and word limit for each answer is approx 120 words.

(vi)    Each question from question nos. 17 to 18 carry 6 marks and word limit for each answer is approx 150 words.

(vii)   Draw neat and labelled diagrams wherever necessary.

Q. 1. Select and write the correct option from the options given in each question: 5 × 1 = 5

(a) Two point charges, each of q, are placed at a separation of 2a, the electric potential at their midpoint will be:

(i) Zero

(ii) $\frac{q}{2\pi\varepsilon_o a}$

(iii) $\frac{q}{8\pi\varepsilon_o a}$

(iv) $\frac{q}{2\pi\varepsilon_o a^2}$

(b) Unit of specific resistance is:

(i) ohm

(ii) ohm$^{-1}$

(iii) ohm metre

(iv) ohm$^{-1}$ metre$^{-1}$

(c) For measuring the current in a circuit, the instrument used is:

(i) Voltmeter

(ii) Ammeter

(iii) Galvanometer

(iv) Voltameter

(d) The device which converts the mechanical energy in to electric energy is:

(i) D.C. motor

(ii) a.c. dynamo

(iii) transformer

(iv) starter

(e) The ozonosphere absorbs the:

(i) visible light

(ii) microwaves

(iii) Infrared radiations

(iv) ultraviolet radiations.

Q. 2.    Fill in the blanks:    $5 \times 1 = 5$

(a)    The distance from pole of spherical mirror to its focus is called
............... of that mirror.

(b)    Resolving limit of a healthy eye is .......... .

(c)    1 eV = ................... Joule.

(d)    The use of zener diode is as ............... .

(e)    The frequency of optical waves is of the order of . ......... .

Q. 3.    Select the appropriate option from column 'B' for each statement of
column 'A' and match the correct pair:    $5 \times 1 = 5$

| Column 'A' | Column 'B' |
|---|---|
| (a)  Unit of currnet density | (i) Ammeter |
| (b)  refractive index | (ii) amp per square metre |
| (c)  Shunted galvanometer | (iii) a physical medium |
| (d)  Communication channel | (iv) $\dfrac{Real\ depth}{Apparent\ depth}$ |
| (e)  Minimum energy for electron emission | (v) convex lense |
|  | (vi) Power of lense |
|  | (vii) Work function |

Q. 4.    Give answer in one sentence each:                                    5 × 1 = 5

(a)    What is the value of specific charge of an electron?

(b)    How is a P-type semi conductor formed?

(c)    Write down the relation between α & β related to amplifier.

(d)    Who invented the television transmission?

(e)    Write the S.I. unit of capacity.

Q. 5.    Write the name of the radiations of shortest and longest wavelength

in the electromagnetic spectrum.                                    2

(OR)    What is greenhouse effect? Explain.

Q.6.     What is reflection? Write the laws of reflection.                                    2

OR)     What is meant by magnification of a lens? Write its expression.

Q.7.     What is photoelectric effect?                                                             2

OR)     What are de-Broglie waves? Establish the de-Broglie wavelength
         equation.

Q.8.     What is meant by 'LASER'? State its two uses.                                        2

OR)     What is demodulation?

Q.9.     State Biot-Savart's law? Define the unit of current.                                4

OR)     Derive expression for the intensity of magnetic field at a point in end
         on position due to a short bar magnet.

Q.10.   Derive expression for the self inductance of a solenoid. What fac-
         tors affect it?                                                                            4

OR)     Obtain expression for an a.c. circuit-

$$P_{av} = V_{rms} \times I_{rms} \, Cos\phi$$

Simplifying Test

Q. 11.    A T.V. antenna is of height h metre. Show that it can be used to transmit the signal up to the distance $d = \sqrt{2hR}$ on the earth surface, where R is the radius of earth.    4

(OR)    Write down four differences between interference and diffraction.

Q. 12.    Describe the astronomical telescope on the basis of the following points:    4

   (i)    Labelled ray diagram

   (ii)    Derivation of formula for magnifying power, when final image is formed at the least distance of distinct vision.

(OR)    Describe the compound microscope on the following headings:

   (i)    Labelled ray diagram of formation of image.

   (ii)    Magnifying power when final image is formed at least distance of distinct vision.

Q. 13.    Differentiate analog signal and digital signal with diagrams.    4

(OR)    What is light emitting diode (LED)? Explain its working principle and state factors on which the colour of light emitted by it depends.

Q. 14.    Describe Van-de Graaff generator under the following points:    5

   (i)    Labelled diagram

   (ii)    Principle

   (iii)    Uses (any two)

   (iv)    Disadvantage

**(OR)** Prove that the electric potential at a point in broad side on position due to an electric dipole is zero.

**Q. 15.** The self inductance of two coils P and S are $L_1$ and $L_2$. The coupling between them is ideal. Show that the mutual inductance between these coils is $M = \sqrt{L_1 L_2}$         5

**(OR)** Deduce expressions for the resultant potential difference, impedance and current in a L-R alternating circuit. Draw graph to show the phase difference between the current and voltage.

**Q. 16.** Explain the use of P-N junction diode as full wave recitifier on the basis of the following points.         5

    (i)    Labelled circuit diagram

    (ii)   Working method

    (iii)  Graph between input and output potential with the variation of time.

**(OR)** How will you obtain OR, AND gates from the NAND and NOR gates? Write symbol, Boolean formula and truth table.

**Q. 17.** Describe experiment to compare the e.m.f.'s of two Cells by potentiometer under the following headings:      6

    (i) circuit diagram          (ii) formula

    (iii) observation table       (iv) two precautions.

**(OR)** With the help of Kirchhoff's Law explain the wheatstone's bridge principle.      6

**Q. 18.** Establish the refraction formula for a thin lens:

$$\frac{1}{f} = (\mu - 1)\left( \frac{1}{R_1} - \frac{1}{R_2} \right)$$

**(OR)** Describe the displacement method to determine focal length of Convex Lense under the following headings:

    (i)     ray diagram

    (ii)     formula derivation

    (iii)    Why the distance between two pins should be greater than 4f?