

2021

**APPLIED PHYSICS-II**

Full Marks: 60

Time: Two hours

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

A. Multiple Choice Questions

1 x 20=20

1. Focal length of plane mirror is
  - a. at infinity
  - b. zero
  - c. negative
  - d. at the center of plane mirror
2. Magnification(m) produced by a rear-view mirror fitted in vehicles is
  - a.  $m > 1$
  - b.  $m < 1$
  - c.  $m = 1$
  - d.  $m = 0$
3. If three capacitors  $C_1$ ,  $C_2$  and  $C_3$  are connected in series, then the equivalent capacity of the combination ( $C_{eq}$ ) is given by
  - a.  $C_{eq} = C_1 + C_2 + C_3$
  - b.  $C_{eq} = 1/(C_1 + C_2 + C_3)$
  - c.  $C_{eq} = \frac{(C_2C_3 + C_3C_1 + C_1C_2)}{C_1C_2C_3}$
  - d.  $C_{eq} = \frac{C_1C_2C_3}{C_2C_3 + C_3C_1 + C_1C_2}$
4. Local action can be removed by
  - a. Electroplating
  - b. Amalgamation
  - c. Mechanical cleansing
  - d. Using depolarizing agent

5. If the currents in two parallel conductors are parallel, then the two conductors will
  - a. Attract each other
  - b. Repel each other
  - c. Unaffected
  - d. Depends of the strength of current.
6. 1 coulomb of charge is equal to \_\_\_\_\_ statcoulomb.
  - a.  $9 \times 10^9$
  - b.  $9 \times 10^{-9}$
  - c.  $3 \times 10^{-9}$
  - d.  $3 \times 10^9$
7. What is the unit of electrical energy?
  - a. Kilo-watt (KW)
  - b. Joule (J)
  - c. Kilo-watt hour (KWH)
  - d. All of the above.
8. Ferromagnetic substances are
  - a. Strongly attracted by the magnets
  - b. Weakly attracted by the magnets
  - c. Repelled by the magnets
  - d. Unaffected by the magnets
9. Lenz's law is in accordance with
  - a. Conservation of charge
  - b. Conservation of quantum number
  - c. Conservation of energy
  - d. All of the above.
10. p-type of semiconductors are example of
  - a. Intrinsic semiconductor
  - b. Extrinsic semiconductor
  - c. Pure semiconductor
  - d. None of the above

11. Photoelectric Effect confirms
  - a. Wave behavior of light
  - b. Particle behavior of light
  - c. Both wave and particle behavior of light
  - d. No specific behavior of light
12. X ray is
  - a. An electromagnetic wave
  - b. A mechanical wave
  - c. An elastic wave
  - d. A sound wave
13. The working principle of optical fiber used in communication is based on
  - a. Reflection of light
  - b. Refraction of light
  - c. Total Internal Reflection
  - d. Dispersion of light
14. Conductivity of semiconductor is
  - a. Same as that of conductor
  - b. Same as that of insulator
  - c. Same as that of superconductor
  - d. More than insulator but less than conductor
15. Nuclei of atoms are made up of protons and neutrons, but the mass of a nucleus is always
  - a. Less than the sum of the individual masses of the protons and neutrons which constitute it.
  - b. More than the sum of the individual masses of the protons and neutrons which constitute it.
  - c. Equal to the sum of the individual masses of the protons and neutrons which constitute it.
  - d. Undetermined.
16. Quanta of light is known as
  - a. Phonon
  - b. Photon
  - c. Electron

- d. Positron
17. The electron volt equals
- $1.6 \times 10^{-10}$  Joule
  - $9.11 \times 10^{-19}$  Joule
  - $1.0 \times 10^{-20}$  Joule
  - $1.6 \times 10^{-19}$  Joule
18. Photoelectric current is directly proportional to
- Kinetic Energy of the electrons
  - Mass of the electrons
  - Intensity of the light
  - Frequency of the incident light
19. If a charge of 120C passes through a conducting wire in 1min, the current will be
- 1A
  - 2A
  - 3A
  - 4A
20. If the power of a convex lens is +0.5D, the focal length of the lens will be
- 2m
  - 20m
  - 25m
  - 20cm

B. Very Short Question (**any six**)

2\*6=12

- What is refractive index? Does it depend on the wavelength of light?
- Define electric potential. What is the relation between electric potential and electric field intensity?
- State Kirchoff's Current law (KCL) and Kirchoff's Votage law (KVL).
- How does a dielectric material can change the capacitance of a capacitor?
- Explain electromagnetic induction.
- Write four properties of X ray

- 7 Write the unit of magnetic flux and magnetic induction.
- 8 Calculate the work when a charge of 40mC is displaced in an electric field of potential difference 5KV.
- 9 What is the relation between the focal length and radius of curvature of a spherical mirror? Calculate the focal length of a spherical mirror whose radius of curvature is 25 cm.

C Short Question (**any seven**)

4\*7=28

1. What are the differences between natural magnet and artificial magnet? What is the origin of magnetic property of the materials?
2. What is the effect of current passing through two parallel conductor? Define Lenz's law.
3. Define photoelectric effect, atomic mass unit (a.m.u.), mass-energy equivalence, mass defect
4. What are semiconductors? Explain about p-type and n-type of semiconductors.
5. Calculate the force of attraction between proton and electron where the separation between them is  $10 \text{ \AA}$ . ( $1 \text{ \AA} = 10^{-10} \text{ m}$ )
6. A concave lens of 20 cm focal length forms an image 15 cm from the lens. Compute the object distance.
7. If three resistors of  $3\Omega$ ,  $6\Omega$  and  $9\Omega$  are connected in parallel in a closed electrical circuit and a battery of 18V is connected across them, find the equivalent resistance and also the total current in the circuit.
- 8 Explain Self and Mutual inductance.
- 9 If a parallel plate capacitor, each plates of cross sectional area  $1 \text{ m}^2$  separated by a distance 2mm where the potential difference across the plates is 1000volt, then find the capacitance of the capacitor
- 10 A  $3\mu\text{F}$  and a  $6 \mu\text{F}$  capacitors are connected in series with a battery 18V. Determine equivalent capacitance and total charge deposited.

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