

Name of the Student: _____

Question No. 1. Encircle the correct option.

(20)

- i. Conductors have conductivities of order
(a) $10^3 (\Omega\text{m})^{-1}$ (b) $10^7 (\Omega\text{m})^{-1}$ (c) $10^{-7} (\Omega\text{m})^{-1}$ (d) $10^{-6} (\Omega\text{m})^{-1}$
- i. The SI unit of stress is same as that of
a. momentum b. pressure c. force d. length
- ii. The material which break after the plastic limit is called
a. brittle material b. Ductile material c. Soft material d. glass
- iii. What type of impurity is added in semiconductor material to get holes?
a. monovalent b. trivalent c. tetravalent d. pentavalent
- iv. The gain G of a inverting operational amplifier is
a. $-R_2/R_1$ b. $1 - R_2/R_1$ c. $1 + R_2/R_1$ d. R_2/R_1
- v. Analog electronics deals with
a. discreet quantities b. continues quantities c. 0 and 1 d. none of these
- vi. $X = A \bullet B$ is mathematical notation for
a. OR gate b. AND gate c. NAND gate d. NOR gate
- vii. In full wave rectifier, we use
a. one diode b. two diodes c. three diodes d. four diodes
- viii. The color of light emitted by LED depends on
a. its forward bias b. its reverse biased c. material nature d. forward current
- ix. Special theory of relativity is based on
a. one postulate b. two postulates c. three postulates d. four postulates
- x. If an object moves with speed of light, then its mass
a. becomes zero b. becomes infinite c. becomes large d. does not change
- xi. The value of Wien's constant is about
a. $2.6 \times 10^{-3} \text{ m K}$ b. $2.7 \times 10^{-3} \text{ m K}$ c. $2.9 \times 10^{-3} \text{ m K}$ d. $3.0 \times 10^{-3} \text{ m K}$
- xii. The energy of a photon having wavelength 1240 nm is
a. 0.5 eV b. 1.0 eV c. 1.5 eV d. 2.0 eV
- xiii. The life time of an electron in an excited state in a substance is
a. 10^{-3} s b. 10^{-6} s c. 10^{-8} s d. 10^{-9} s
- xiv. The chemical properties of an element depends only upon the number of
a. electrons b. c. neutrons d. mesons
- xv. The radius of fourth Bohr orbit in hydrogen atom is greater than radius of the first orbit by a factor of
a. 4 b. 9 c. 16 d. 25
- xvi. The series in ultraviolet region is
(a) Balmer series (b) Pfund series (c) Paschen series (d) Lyman series
- xvii. $1 \text{ amu} =$
(a) 9.31 MeV (b) 931 MeV (c) 9.031 MeV (d) 0.931 MeV
- xviii. The half life of iodine is 8 days. Its decay constant is
a. $1.0 \times 10^{-6} \text{ s}^{-1}$ b. $1.5 \times 10^{-6} \text{ s}^{-1}$ c. $2.0 \times 10^{-6} \text{ s}^{-1}$ d. $2.5 \times 10^{-6} \text{ s}^{-1}$
- xix. The energy needed to produce an electron-hole pair in solid state detector is about
a. 3 to 4 eV b. 5 eV c. 5 to 6 eV d. 6 eV
- xx. 1 rem is equal to
a. 0.05 Sv b. 0.04 Sv c. 0.03 Sv d. 0.01 Sv

Question No. 2 Write short answers to the following questions.

2x6=12

- i. Define modulus of elasticity. Show that the units of modulus of elasticity and stress are same.
- ii. Differentiate between digital and analog system in electronics.
- iii. What is a photon of light? Also calculate its momentum in terms of wavelength of a moving photon.
- iv. Write three advantages of electron microscope over optical microscope.
- v. Define pair production and explain why the heavy nucleus is need for it.
- vi. What do you mean by critical mass of a radio active substance?
- vii. What is the net charge on an n-type and p-type substances?
- viii. As a solid is heated it begins to flow, why does it appear red first?

Question No. 3

- a. Define transistor. How can it be used as a CE amplifier? Also calculate it voltage gain from circuit diagram. (5)
- b. A particle of mass 5.0 mg moves with speed of 8.0 ms^{-1} . Calculate its de Broglie wavelength. (3)

OR

Question No. 4

- a. Explain the working of helium- neon laser. (5)
- b. A 50 keV photon is Compton scattered by a quasi-free electron. If the scattered photon comes off at 45° , what is it wavelength? (3)