

**Kamla Nehru Mahavidyalaya, Nagpur**

**Question Bank**

**B.Sc.Sem- VI**

**Physics Paper-I**

1. According to the special theory of relativity, physical laws are the same in frames of reference which

a) move at uniform velocity b) accelerate. c) move in circles. d) move in ellipses.

2. Clocks in a moving reference frame, compared to identical clocks in a stationary reference frame, appear to run

a) slower. b) at the same rate. c) faster. d) backward in time.

3. The term "relativistic" refers to effects that are

a) observed when speeds are near the speed of light. b) noticed about a moving object. c) observed when objects move backward in time. d) measured by stationary observers only.

4. The purpose of the Michelson-Morley experiment was to

a) determine the velocity of light. b) detect possible motion of the Earth relative to the sun. c) detect possible motion of the sun relative to the ether. d) detect possible motion of the Earth relative to the ether

5. A train has a rest length of 100 m. Traveling at a very high velocity, it goes through a tunnel of length 80 m. Observers located at both ends of the tunnel note that at one instant the train appears to exactly fit within the tunnel. What is the velocity of the train expressed in units of  $c$ ?

a)  $0.866c$  b)  $0.333c$  c)  $0.50c$  d)  $0.60c$

6. A spaceship, moving toward the Earth at a speed of  $0.9c$ , shines a green laser at Earth. An observer on Earth would see the light arriving at a speed of

a)  $0.1c$  but at a smaller frequency. b) wavelength  $c$  but at a shorter. c)  $1.9c$  and with a shorter wavelength. d)  $0.1c$  and with an inverted frequency

7. If an object reaches the speed of light, its length changes to \_\_\_\_\_

a) Infinite b) Double of the value c) Half of the value d) Zero

8. The length of a rod seems shorter to an observer when it moves in a specific direction. What change would he observe when the direction of rod changes by  $180^\circ$ ?

a) The rod becomes even smaller b) The length of the rod increases c) The length of the rod remains the same d) The rod has the length equal to its proper length

9. Relative to its period on the earth, the period a pendulum on the moon is

a. Shorter b. Longer c. The same as on the earth d. Varies with time

10. \_\_\_\_\_ transformation are replaced by the Lorentz transformation which confirms the postulate of relativity.

a) Galileian b) Maxwell c) Plancks d) Newtons

11. Calculate the velocity of a body if its total energy is three times its rest

a)  $0.54c$  b)  $0.76c$  c)  $0.94c$  d)  $c$

12. Lorentz transformation of momentum for Y component \_\_\_\_\_

a)  $P'_y = P_y$  b)  $P'_y = P_z$  c)  $P'_y = E_x$  d)  $P'_y = B_x$

13. According to Einstein's Special Theory of Relativity, laws of physics can be formulated based on \_\_\_\_\_

a) Inertial Frame of Reference b) Non Inertial Frame of Reference c) both non and Inertial Frame of Reference d) Quantum state

14. As an object approaches the speed of light, its mass becomes \_\_\_\_\_

a) zero b) double c) remain same d) infinite

15. In relativity an electric field and magnetic fields are \_\_\_\_\_

a) dependent b) independent c) interdependent d) null

16. Which of the following is not a type of radiation detectors?

- a) Geiger Muller counter
- b) Proportional counter
- c) Semiconductor detector
- d) Flame emission detector

17. Which of the following acts as quenching gas in Geiger Muller counter?

- a) Alcohol
- b) Argon gas
- c) Krypton
- d) Hydrogen

18. Which of the following acts as ionising gas in Geiger Muller counter?

- a) Alcohol
- b) Argon gas
- c) Krypton
- d) Hydrogen

19. A cyclotron operates with a given magnetic field and at a given frequency. If  $R$  denotes the radius of the final orbit, the final particle energy is proportional to:

A)  $1/R$  B)  $R$  C)  $R^2$  D)  $R^3$  E)  $R$

20. A moderator is used to slow down

- a) protons
- b) alpha particles
- c) neutrons
- d) beta particles
- e) photons

21. Cyclotron cannot accelerate

- a. Electrons
- b. Neutrons
- c. Positive ions
- d. (Both (1) and (2))

22. All the above Cyclotron can be used in

- a. Particle therapy to treat cancer
- b. Source of high energy beam for a nuclear physics experiment
- c. Produce short-lived positron-emitting isotopes for PET imaging
- d. All of the above

23. Which of the following best define nuclear forces?

- a) The attraction between protons and neutrons
- b) Repulsion between protons and neutrons
- c) The attraction between protons and electrons
- d) The attraction between electrons and neutrons

24. The nuclear force is short-ranged.

- a) True
- b) False

25. Which of the following forms the basis of a nuclear reactor?

- a) Uncontrolled chain reaction
- b) Fast nuclear reaction
- c) Controlled chain reaction
- d) Catalyst controlled nuclear reaction

26. What is emitted during Beta Radiation?

- a high-energy Electron.
- b Protons.
- c Neutrons.
- d Nuclei

27. The existence of the neutrino was postulated in order to explain

- a. alpha decay.
- b. gamma emission.
- c. beta decay.
- d. fission.

28. When an alpha particle is emitted from an unstable nucleus, the atomic mass number of the nucleus
- increases by 2.
  - decreases by 2.
  - increases by 4.
  - decreases by 4.
  - none of the above.
29. The atomic mass unit is defined as
- the mass of a proton.
  - the mass of an electron.
  - the mass of a hydrogen-1 atom.
  - one twelfth the mass of a carbon-12 atom.
30. The binding energy per nucleon
- increases steadily as we go to heavier elements.
  - decreases steadily as we go to heavier elements.
  - is approximately constant throughout the periodic table, except for very light nuclei.
  - has a maximum near iron in the periodic table.
31. The atomic mass unit is defined as
- the mass of a proton.
  - the mass of an electron.
  - the mass of a hydrogen-1 atom.
  - one twelfth the mass of a carbon-12 atom
32. Why is a fusion reaction difficult to perform?
- The nuclei are set up far from each other
  - The attraction between the nuclei
  - Sun's energy is not sufficient
  - Repulsion between the nuclei
33. What is the energy released in the fission of 2 kg of Uranium 235? (Given: energy per fission = 200 MeV)
- $1.64 \times 10^{14}$  J
  - $1.64 \times 10^{15}$  J
  - $2.64 \times 10^{14}$  J
  - $1.64 \times 10^{20}$  J
34. A beta<sup>-</sup> particle is also known as
- an electron.
  - a positron.
  - a helium nucleus.
  - a photon.
35. The existence of the neutrino was postulated in order to explain
- alpha decay.
  - gamma emission.
  - beta decay.
  - fission.

36. When an alpha particle is emitted from an unstable nucleus, the atomic mass number of the nucleus
- increases by 2.
  - decreases by 2.
  - increases by 4.
  - decreases by 4.
  - none of the above.
37. Isotopes of an element have nuclei with
- the same number of protons, but different numbers of neutrons.
  - the same number of protons, and the same number of neutrons.
  - a different number of protons, and a different number of neutrons.
  - a different number of protons, and the same number of neutrons.
38. What is the energy released in a nuclear reaction called?
- R-value
  - Q value
  - P-value
  - Nuclear energy
39. cyclotron frequency of an electron grating in a magnetic field of 1 T is approximately
- 28 MHz
  - 280 MHz
  - 2.8 GHz
  - 28 GHz
40. Suppose a cyclotron is operated at an oscillator frequency of 12 MHz and a dee radius of 53cm. What is the resulting kinetic energy of the deuterons?
- 16.6 MeV
  - 12 MeV
  - 15 MeV
  - 14 MeV
41. The angular frequency of a cyclotron is independent of
- Speed
  - Mass
  - Magnetic field
  - Charge
42. The maximum kinetic energy of the positive ion in the cyclotron is
- $qBR^2/2m$
  - $q^2B^2R^2/2m$
  - $q^2B^2R^2/m$
  - $qBR/m$
43. Find the true statement.
- Nuclear charge is dependent on the charge
  - The nuclear force is weaker than the electromagnetic force
  - The nuclear force is independent of charge
  - The nuclear force is weaker than the gravitational force

44. This value  $9.1 \times 10^{-31}$  is represented the mass of \_\_\_\_\_.
- a) Electron b) Photon c) Neutron d) Muon
45. Biopotentials are ionic voltages produced when certain types of cells carry out electrochemical activities, true or false?
- A. True  
B. False
46. Electroencephalogram is obtained from bioelectrical signals from the?
- A. Brain  
B. Heart  
C. Muscles  
D. Retina
47. Physiological Signals are generated by the body during the functioning of various physiological systems. Therefore, physiological signals hold information which can be extracted from these signals to find out the state of functioning of these physiological systems, true or false?
- A. True  
B. False
48. The following are properties of ultrasound waves as applied in medical imaging, except?
- A. They are longitudinal  
B. They are acoustic  
C. They are electromagnetic  
D. They depend upon the medium through which it propagates
49. Which of the following statements is false about single beam absorption instruments?
- a) Tungsten bulb is used as a source  
b) Beam splitter is used to get parallel beam  
c) Test tube is used as sample holder  
d) Photovoltaic cell as detector
50. Which of the following is not an application of colorimeter?
- a) Paints  
b) Inks  
c) Cosmetics  
d) Composition detection
51. Colorimeters are used in applications where great accuracy is required.
- a) True  
b) False
52. All the following are examples of biopotentials, true or false?
- Electroencephalogram (EEG)
  - Electromyogram (EMG)
  - Electroretinogram (ERG)
- A. True  
B. False
53. Electrocardiograph (ECG) is a graphic recording or display of the time variant produced by the heart during the cardiac cycle, true or false?
- A. True

B. False

54. pH meters can be considered as voltage sources with which of the following internal resistances?

- a) Very low resistance
- b) Moderate resistance
- c) Very high resistance
- d) No resistance

55. Which of the following is not a failure in pH meters?

- a) Defective electrodes
- b) Defective input circuitry
- c) Defective electronic circuitry
- d) Defective calibration

56. The following are the major functional physiological systems of the body except?

- A. Cardiovascular system
- B. Respiratory system
- C. Electrocardiogram system
- D. Nervous system

57. How can you define electromyogram (EMG)?

- A. The recorded representation of bioelectric potentials generated by the activity of the brain (Neuronal activity).
- B. The biopotentials generated by the muscles of the heart with time.
- C. The recorded representation of bioelectric potentials generated by the muscle activity.
- D. The measure of the variations in the corneal-retinal potential.

58. In photometers, the readings of the specimen are initially obtained in the form of which of the following parameters?

- a) Transmittance
- b) Absorption
- c) Wavelengths
- d) Volume

59. Which of the following is the purpose of the beam splitter in double beam photometer or colorimeter?

- a) Splits beam into two equal intensity beams
- b) Splits beam in such a way that sample beam has higher intensity
- c) Splits beam in such a way that a reference beam has higher intensity
- d) Merge two equal intensity beams into single beam

60. Which of the following is a source used in spectroscopy?

- a) LASER
- b) Tube light
- c) Sodium vapour lamp
- d) Tungsten lamp

