

University of Mumbai
Sample Question Paper
Examination – 2020 Semester -I

0212_R19_FE_I_FEC102_QP1

1) Which of the following experiments could never show quantum mechanical results ?

- A. Taking thousands of measurements and forming probabilistic models of those measurements.
- B. Taking thousands of identically prepared particles and measuring them one at a time
- C. Sending one electron at a time through a double-slit apparatus so that the electron can interfere with itself, and measuring the screen.
- D. Sending one electron at a time through a double-slit apparatus and measuring which slit it goes through, so that the electron won't interfere with itself.

2) If I know the position of a subatomic particle precisely, then

- A. I know nothing about the particle's momentum.
- B. I know a very limited amount about the particle's momentum.
- C. The particle must be at rest.
- D. The particle can't be at rest.

3) Which of the following is false about quantum mechanics?

- A. A particle has a chance to be found in a region which should classically be impossible for it to be found in.
- B. An electron can seem to interfere with itself when passing through double slits.
- C. Energy is quantized.
- D. Momentum is quantized E.

4) Electromagnetic waves with minimum wavelength is:

- A. Ultraviolet rays
- B. X-rays
- C. Infrared rays
- D. gamma-rays

5. The diameter of the optical fiber is of the order of

- A. μm
- B. mm
- C. cm
- D. km

6. Interference of light is evidence that:

- A. the speed of light is very large
- B. light is a transverse wave
- C. light is electromagnetic in character
- D. light is a wave phenomenon

7. In a Young's double-slit experiment the center of a bright fringe occurs wherever waves from the slits differ in the distance they travel by a multiple of:

- A. a fourth of a wavelength
- B. a half a wavelength
- C. a wavelength
- D. three-fourths of a wavelength

8. In a Young's double-slit experiment, the slit separation is doubled. To maintain the same fringe spacing on the screen, the screen-to-slit distance D must be changed to:

- A. $D/2$
- B. $D/2$

C. D^2

D. 2 D

10 Advantages of supercapacitor modules vs batteries?

A. Supercapacitors offer higher power densities,

B. Supercapacitors needs no charging

C. Supercapacitors generate power

D. Supercapacitors are Eco. Friendly device

11. A semiconductor has temperature coefficient of resistance.

A. Positive

B Negative

C. Zero

D. infinite

12 When a pure semiconductor is heated, its resistance

A. Goes up

B.Goes down

C. Remains the same

1.D. Can't say

13 Which of the following expression represent the correct formulae for calculating the exact position of the Fermi level for p-type material?

A. $E_F = E_V + kT \ln(N_D / N_A)$

B. $E_F = -E_V + kT \ln(N_D / N_A)$

C. $E_F = E_V - kT \ln(N_D / N_A)$

D. $E_F = -E_V - kT \ln(N_D / N_A)$

14. By which properties, the orientation of molecules in a layer of liquid crystals can be changed?

- A. Magnetic field
- B. Electric field
- C. Electromagnetic field
- D. Gallois field

15. The direction of electric field in an LCD is determined by

- A. the molecule's chemical structure
- B. Crystalline surface structure
- C. Molecular Orbital Theory
- D. Quantum Cellular Automata

16. In the Hall Effect, the electric field is in x direction and the velocity is in y direction. What is the direction of the magnetic field?

- A. X
- B. Y
- C. Z

D. XY plane

17. Calculate the hall voltage when the Electric Field is 5V/m and height of the semiconductor is 2cm.

A. 10V

B. 1V

C. 0.1V

D. 0.01V

18. For plane (1 0 0) of BCC having a lattice parameter 'a', planar atomic density is given by?

A. $1/a^3$

B. $2/a^2$

C. $3/a^4$

D. $1/a^2$

19. Which of the following equation describes Bragg's law of diffraction? (Assume that all symbols have their usual meaning.)

A. $2d \sin\theta = \lambda$

B. $2d = n\lambda$

C. $2d = n\lambda \sin\theta$

D. $2d \sin\theta = n\lambda$

20. For plane (1 1 1) of BCC having a lattice parameter 'a', planar atomic density is given by?

A. $1.07/a^2$

B. $0.58/a^2$

C. $2.07/a^2$

D. $0.78/a^2$