

**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.  $\mu\text{m}$
- 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.  $2D$

**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**

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- 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.  $0.78/a^2$