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M.Sc.sem-III
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Subject :Physics
Paper:MS-PHY 303
Quantum Mechanics-3 and Solid State Physics-3

કુલ સમય :– ૬૦ મીનીટ કુલ પ્રશ્નો : ૫૦ વિદ્યાર્થીએ ટીક કરવાના પ્રશ્નો : ૩૫

નોંધ : વિદ્યાર્થીએ માત્ર ૩૫ પ્રશ્નો જ ટીક કરવાના રહેશે. જો વધારે ટીક કરેલ હશે તો પ્રથમ ૩૫ પ્રશ્નો જ ગણતરીમાં લેવામાં આવશે.

1.Scattering occurs with….. …….

A. particle only B.wave only C.both a and b D. none of these

2. which of the following information obtained with scattering……

A. internal structure of the matter. B.kind of interaction between target and projectile.

C.both a and b is correct D.none of these

3. Which of the following quantity have unit m^2….

A.length B.volume C. area D.scattering cross section

4. In scattering detector is kept.....

A.closetothetarge B.In asymptoticregion C.anywhere D.noneof these

5.In born approximation deviation of free particle wave function is ……

A.zero B. large C small D. very small

6.Which function is used to get solution of scattering amplitude….

A.Rodriges B. langeder polynomial C any fuction D. none of these

7.momentum transfer in scattering phenomena is given by….

A. (h/2π)I B. (h/2π)k C. . (h/2π)o D.none of these

8.Ω u_0x =……

A. 1 B. 2π C. 0 D. none of these

9.Scattering amplitude is….

A. Real quantity B.Imginary quantity C.complex quantity D.None of these

10. Scattering cross section is ….

A. real quantity B.imginary quantity C.complex quantity D.None of these

11.At a large distance from the scattering centre motion of the particles is….

A.radially outward B. helical C spiral D. circular

12.which of the following is the angle between ;planes is the angle between ….

A.plane angle B Azimuthal angle Φ C both A and B D. none of these

13.Particles involved in quantum mechanical scattering are described by…

A.wave B. particle C both A and B D. none of these

14.Plane waves describes….

A.parrellel beam of particles B. Spherical wave C cylindrical wave D. none of these

15.Where potential energy is zero in scattering process

A. In asymptotic region B close to the detector C at target D. no where

16. For scattered wave function U_{sc} α

A. 1/r B. r C $1/r^3$ D. $1/r^4$

17.velocity of incident particles…

A. (h/2π)I B. $\hbar k / m$ C.2 πk D. hk/m

18. How total cross section is obtained?

A. by integrating $\frac{d\sigma}{d\Omega}$ over all directions B. by $\frac{d\sigma}{d\Omega}$ integrating over Θ

C. by $\frac{d\sigma}{d\Omega}$ integrating over ϕ only D. by differentiating $\frac{d\sigma}{d\Omega}$ with respect to Θ and ϕ

19.When wave function in the scattering is steady?

A. when incident particle is steady B. when Target is steady

C. When detector is steady D. when steady beam of incident particle maintained for all time

20 partial wave analysis is possible when potential is .....

A. spherically symmetric B. asymmetric C.a and b is correct D.None of these

21Notation for differential cross section….

A. $\frac{d\sigma}{dt}$ B. $\frac{d\sigma}{dp}$ C. $\frac{d\sigma}{dx}$ D. None of these.

22.Flux of scattered particles…

A. depends on direction B. does not depends on direction C. both a anf b true with D.none of these

23.Optical theorem given by….

A. $\sigma = \frac{4\pi e}{k}\text{Im } f(0)$ B. $\sigma = \frac{4}{k}\text{Im } f(0)$ C. $\sigma = \frac{\pi}{k}\text{Im } f(0)$ D. none of these

24.Phase shift is zero for ….

A. V<0 B. V>0 C.V=0 D. V=infinite

25.Phase shift depends only on …..

A. volume B. area C.asymptotic for of R_l D.None of these

26. Importance of NMR in__

A.Thermodynamics B. organic chemistry C electro dynamics D. classical mechanics

27. Which Nuclei have an electric quadrupole moment?

AI≥1 B..I≤1 C. I<1 D. I=0

28.What is the value of hyperfine constant a for ground state of free Li atom?

A.444 gauss B. 402 gauss C.85 gauss D.none of these

29. ferromagnet has spontaneous …

A. .electric current B.voltage C.Power D.Magnetic moment

30.Magnitude of exchange field is as high as……gauss

A. .10 B.10^7 C10^8 D. 10^9

31.Quantized spin wave is called….

A. normalization B.photon C.magnon D fermion

32.Magnetic moment per unit volume is called…

A. electric current B.voltage C.Power D.Magnetization

33.Above curie temperature …….vanishes.

A.spontaneous magnetization B.voltage C.Power D.Magnetization

34.Which of the following equation is Heisenburg model

A.U=mgh B.V=IR C.$E=mc^2$ D.none of these

35.Hyperfine interaction is a interaction between….

A. .elecron magnetic moment and nuclear magnetic moment B.voltage And.Power

C.Magnetization electric field. D.None of these

36.Curie Weiss Law reptresented by….

A. T_c=VC B. $T_c = C/\lambda$ C.p=mv D.none of these

37.Which of the following is antiferromagnet?

A.MnO B.Fe C.Co D.Ni

38.Coercive field is a field that …..

A.create domain B.produce magnetic field C.Makes magnetic induction zero D.None of these

39.Susceptibility is…..

A. directly prapotional to temperature B. inversly prpotional to temperature

C.no dependence on temperature D. . directly prpotional to square of temperature

40.In spins are anti parrellel in

A. ferromagnetism B.paramagnetism C. antiferromagnetism D.none of these

41. Nuclear magnetic moment μ=……..

A. ϒħI B. ϒħ/I C. ϒħ D 2 ϒħI

42. Overall efficiency of conversion of Ruby laser is about….%

A. 2 B. 3 C. 4 D. none of these

43.In MASER which of the following waves are amplified?

A. light B.Microwave C.Infrared D.Ultraviolet

44…….Excellent crystal for three level maser

A. Ruby B. Quartz CRochelle salt D. None of these

45.In Cr^{+3} ground level splits into…….states in magnetic field

A. 4 B.3 C.2 D.10

46.How intensity of radiation field can be increased?

A. By Applyiing electric field B. By Applyiing magneticfield

C.keeping in electromagnetic cavity D.none of these

47.NMR is a powerful tool for …..

A. laser B.maser C.nuclear fusion D.structure determination of complex molecule

48.Angular momentum of nucleus is ……

A. (h/2π)I B. (h/2π)k C. . (h/2π)o D.none of these

49.Torque on magnetic moment….

A. (h/2π)I B. (h/2π)k C. . (h/2π)o D. μ X B

50. The only magnetic ions in YIG are……

A. ferric ions B. Cu^+ C. electrons D. Na^+