Physics Mcq KU

1. Phase space is a
a) 3 Dimensional space
b) 4 " "
c) 5 " "
[✓ d) 6 Dimensional space]

2. The thermodynamic probability is a German word

3. the thermodynamic probability is represented by Ω, $\Omega = \frac{\lfloor N}{\lfloor n_1 \lfloor n_2 \lfloor n_3 \ldots \lfloor n_k}$ or $\Omega = \frac{\lfloor N}{\Pi_{i=1}^{k} \lfloor N_i}$
Total favourable chances in Probability

4. the thermodynamic probability is denoted by. $\Omega = \sum_{j=1}^{n} W_j$

5. If the two parts A & B in a system are considered to be in equilibrum & having thermodynamic probabilities WA & WB, What will be the thermodynamic probability of the system?
[✓ a. W = WA . WB]
b. W = WA + WB
c. W = (WA + WB)/2
d. W = √(WA - WB)

6. The Total favourable chances of distribution of N molecules in k cells is called thermodynamic probability

or

The no of microstate in a given macro state is called thermodynamic probability

7. The max probability of finding the particle b/w two limits is (D) one

8) Total No. of favourable ways to enter n1 molecules in cell one is $^{N}C_{n1} = \frac{\lfloor N}{\lfloor n1 \lfloor N-1}$

9) The probability density of a particle is always. +ve

10 Boltzman's fundamental equation relates the thermodynamic entropy S to the no. of microstates W

11 for two particles (A & B) in two energy sub-levels the population represented by (A, B) is considered distinct from the population [B, A] which statistics. Maxwell - Boltzman

12 Maxwell-Boltzmann statistics are particularly useful for studying gases that are
Dense not dense ✓ volatile condensed

13 Maxwell - Boltzman statistics are often described as the statistics of distinguishable classical particles

14 The maxwell Boltzmann statistics describes the distribution of speeds among the particles

15 Maxwell Boltzmann statistics cannot be applied to: C) Photons

16 The Maxwell - Boltzmann law is given by the expression $\frac{1}{e^{\left(\alpha + \frac{E}{KT}\right)}}$

K is boltzman constant value 1.98×10^{-23} J/K & T is temp. constant α depends upon volume & temp of the gas.

17 which equation is called boltzman distribution law $\boxed{\frac{n_i}{g_i} = e^{-(\alpha + \beta E_i)}}$

$\frac{n_i}{g_i} = e^{-\alpha} \cdot e^{-\beta E_i}$

$\boxed{\frac{n_i}{n} = \frac{e^{-\beta E_i}}{\sum e^{-\beta E_i}}}$

18 The radiations emitted by hot bodies are called Black body radiation

19 As the wavelength of the radiation decreases, the intensity of the black body radiations first increases then decrease

20 A certain black body radiates at 1 Kw when its temp is 500°C. At which rate will it radiate when its temp is 75°C 5.06 Kw

21 In the long wavelength limit, plank's radiation law reduces to Rayleigh - Jeans law

22 Stefan's law states that the energy radiated per unit time of black body is proportional to (Given A is the area & T is the temp)

A) AT^3 (B) AT^{-4} [✓ (C) AT^4] (d) AT^{-3}

$\boxed{E\lambda = \sigma T^4}$ → stefan's law

23 Which law removed the UV catastrophe in Rayleigh-Jeans law?

A) wien's displacement law (B) stefan's Radiation law

(C) Planck's Radiation law [✓ (D) All of these]

24 Wein's law states that the black body radiation curve for different temp peak at a wavelength is inversely proportional to temperature

$\lambda_{max} T = C$

Total energy $E_\nu = A^{e-B\nu} / T\nu^3$

25 The Planck's constant h has the dimensions equal to ML^2T^{-1}

26 In rayleigh jeans law No. of stationary waves is equal to $\frac{8\pi\nu^2}{c^3}$ & average energy for vib mode = KT i.e $\langle E \rangle = KT$.

27 ToTal energy of rayleigh jeans law =
$$E\nu = \left(\frac{8\pi KT}{C3}\right)$$

28 Rayleigh jeans law is good for Lower frequency

29 The value of Plank's constant h is 6.6×10^{-34} J.s

30 The Plank's radiation law is given by. —
$$\frac{8\pi h\nu^3 d\nu}{c^3 e^{h\nu/KT} - 1}$$

31 Planks law is $E\nu = nh\nu$

32 ultraviolet catastrophe term was given by 1911 by Paul ehrenfest

32 If the blackbody is heated at a high temp. it seems to be. White.

33 ultraviolent catastrophe is expressed energy density → 0 as λ → ∞

34 compton wavelength is given by $\lambda_C = h/mc$

35. The compton effect can be explained on the basis of Quantum theory of light

36 What kind of photon is required for the Compton effect to occur X ray photon

37. Heisenberg gave his concept in 1927

38 The uncertainty principle applies to microscopic particles

39 Heisenberg's principle states that the

(A) uncertainties in energy & time $\geq h/2$.

(B) // // momentum & position $\geq h/2$

(C) Both (A) & (B)

(D) None

40 which represent the heisenberg uncertainty principle

(A) $\Delta x \cdot \Delta p \geq \frac{h}{4\pi}$

(B) $\Delta E \cdot \Delta T \geq \frac{h}{4\pi}$

(C) Both (a & b)

(D) $\Delta E \cdot \Delta x \geq h$/ [illegible]

41 Schrodinger wave equation is

$$\frac{\partial^2 \psi}{\partial x^2} + \frac{\partial^2 \psi}{\partial y^2} + \frac{\partial^2 \psi}{\partial z^2} + \frac{8\pi^2}{h^2} m (E-V)\psi = 0$$

42. Schrodinger wave eqn is applicable to non relativistic motion

43. According to de broglie the wave length of electron is Inversely proportional to velocity of particle

44. Acc. to de broglie relation if velocity of particle is infinities wavelength will be zero

45 The de broglie wavelength associated with the particle of mass m moving with velocity v is. $\lambda = h/mv$ or $\lambda = h/p$

46 The de broglie wavelength associated with an electron having K.E (E) is given by the expression $\lambda = \frac{h}{\sqrt{2mE}}$

47 The energy (E_0) of a harmonic oscillator corresponding to $n=0$ is equal to $hv/2$ or $\frac{1}{2}hv$

48 The energy (E_1) of a harmonic oscillator, corresponding to $n=1$ is equal to $3hv/2$

49 The energy operator $\hat{E}$ is given by $i\hbar\, d/dt$ or $i\hbar\, \partial t/\partial t = H/\partial t$

50 operator form of schrodinger wave equation is $\hat{H}\psi = E\psi$ h = hamiltonian.

51 The allowed energies for a particle in a one dimensional box of length L is given by which of the following. $E = \frac{n^2h^2}{8mL^2}$

52 If W represents the no. of microstates associated with macrostate, the entropy of the system is given by $S = k \ln W$

53 A particle is confined to a one dimensional box of finite length with perfectly rigid walls. If E_1 is the energy of the lowest energy level, then the difference in energies b/w the nth level & the $(n+1)^{th}$ is $(2n+1)E_1$

54 The potential energy stored in a simple harmonic oscillator at position x is $U = \frac{1}{2}kx^2$

57. The pot energy of a linear harmonic oscillator of mass m & angular frequency w is $\frac{1}{2} m\omega^2 x^2$.

58. The pot energy of linear harmonic oscillator is $V = \frac{1}{2} Kx^2$.

59. The angular momentum of electron in n^{th} orbit is given by $\frac{nh}{2\pi}$

60. Frequency of linear harmonic oscillator

$$V = \frac{1}{2\pi}\sqrt{\frac{K}{m}}$$

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61. Eigen value of ToTal energy $E_n = \left(n+\frac{1}{2}\right)h\nu$

62. The phase diff. b/w displacement & acceleration of a particle in a simple harmonic motion is π rad

63. Simple harmonic oscillator is $\vec{F} = -K\vec{x}$

64. equation particle in 1 dimention

$$\psi(x) = \sqrt{\frac{2}{L}} \sin \frac{n\pi}{L} x$$

65. wave eqn

$$\frac{d^2\psi}{dx^2} + \left(\frac{2mE}{\hbar^2} - \frac{m^2 w^2}{\hbar^2} x^2\right)\psi = 0$$

66. Acc to Bohr's atomic model, the radius of the orbit is directly proportional to n^2

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9 Acc to Bohr's atomic model, the angular momentum of orbits is multiple of $h/2\pi$ or $nh/2\pi$ or mvr

10. Acc to Bohr's 2nd postulate De broglie interprets in terms of wave nature of the electron a circular orbit can be taken to be a stationary energy state only if it contains an integral no of de broglie wave lengths

It is given as

$$2\pi r = \frac{nh}{mv}$$

$$\therefore mvr = \frac{nh}{2\pi} \qquad \vec{L} = \vec{r} \times \vec{P}$$

$$= r \times mv$$

$$= mvr$$

$2\pi r = \frac{nh}{mv}$

$mvr = \frac{nh}{2\pi}$

$$\boxed{L = \frac{nh}{2\pi}}$$