# B. TECH/BT-MT 2nd SEMESTER MID TERM EXAMINATION 2021 ENGINEERING PHYSICS-II (UAD12B12/DTPH12B10)

* Required

Part – A

The Fermi energy of a system of particles depends on the concentration of fermions as

(a) $E_f \propto \left(\frac{N}{V}\right)^2$ (b) $E_f \propto \left(\frac{N}{V}\right)^{\frac{3}{2}}$ (c) $E_f \propto \left(\frac{N}{V}\right)^{\frac{2}{3}}$ (d) $E_f \propto \left(\frac{N}{V}\right)^{\frac{1}{3}}$

- Option (a) correct
- Option(b) correct
- Option (c) correct
- Option (d) correct

*

If $v_p$ be the phase velocity of the de-Broglie wave and $c$ be the velocity of light, then

(a) $v_p < c$ (b) $v_p > c$ (c) $v_p = c$ $v_p = v_g = c$

- Option (a) correct
- Option (b) correct
- Option (c) correct
- Option (d) correct

*

A photon has energy 85 eV. It's momentum will be

(a) $4.5\times10^{-25}$ kg-m/s (b) $4.5\times10^{-24}$ kg-m/s

(c) $45\times10^{-26}$ kg-m/s (d) $45\times10^{-27}$ kg-m/s

- Option (a) correct
- Option(b) correct
- Option (c) correct
- Option (d) correct

*

The numbers of possible arrangements of 3 particles in 3 cells using Bose-Einstein statistics is

(a) 10 (b) 1 (c) 27 (d) 9

- Option (a) correct
- Option(b) correct
- Option (c) correct
- Option (d) correct

*

The eigen values of Hermitian operator are always
(a) Real (b) imaginary (c) complex (d) zero

- Option (a) correct
- Option(b) correct
- Option (c) correct
- Option (d) correct

*

In He-Ne gas laser, the ratio of mixture of Ne gases and He gases is

(a) 1:10 (b) 10:1 (c) 10:5 (d) 11:1

- Option (a) correct
- Option(b) correct
- Option (c) correct
- Option (d) correct

Consider wave function of a particle as $\psi(x) = Asin\frac{n\pi x}{L}$ trapped in a region of length L. The value of the normalization constant is:

(a) L (b) L/2 (c) $\sqrt{(L/2)}$ (d) $\sqrt{2/L}$

- Option (a) correct
- Option(b) correct
- Option (c) correct
- Option (d) correct

*

The temperature at which the rates of spontaneous and stimulated emission are equal is (Assume λ = 5000Å)

(a) 41,558 K (b) 632 K (c) 45001 K (d) None of these

- Option (a) correct
- Option(b) correct
- Option (c) correct
- Option (d) correct

*

Which is the correct relation between Einstein's coefficient $A_{21}$ and $B_{21}$

(a) $\frac{A_{21}}{B_{21}} = \frac{8\pi h\nu^3}{c^3}$ (b) $\frac{A_{21}}{B_{21}} = \frac{8\pi h\nu^4}{c^2}$

(c) $\frac{A_{21}}{B_{21}} = \frac{8\pi h\nu^2}{c^4}$ (d) None of the above

- Option (a) correct
- Option(b) correct
- Option (c) correct
- Option (d) correct

*

If the systems exchange energy, but not matter in between each other, then the corresponding ensemble is

(a) Canonical (b) Micro canonical

(c) Grand canonical (d) all of these

- Option (a) correct
- Option(b) correct
- Option (c) correct
- Option (d) correct

*

The life time of an excited state of an atom is $10^{-8}s$ . The minimum uncertainty of energy of the excited state is

(a) $6.58 \times 10^{-8}eV$ (b) $1.05 \times 10^{-26}eV$

(c) $1.05 \times 10^{-8}eV$ (d) $6.58 \times 10^{-26}eV$

- Option (a) correct
- Option(b) correct
- Option (c) correct
- Option (d) correct

*

The spin angular momentum of photon is

(a) 0 (b) $\frac{1}{2}\hbar$ (c) $\hbar$ (d) $\frac{3}{2}\hbar$

- Option (a) correct
- Option(b) correct
- Option (c) correct
- Option (d) correct

*

The particles obeying Maxwell Boltzmann statistics have

(a) Integral spin
(b) half integral spin
(c) spinless
(d) up spin

- Option (a) correct
- Option(b) correct
- Option (c) correct
- Option (d) correct

*

A metastable state has life time of the order of

(a) $10^{-8}$ s (b) $10^{-3}$ s (c) $10^{-10}$ s (d) $10^{3}$ s

- Option (a) correct
- Option(b) correct
- Option (c) correct
- Option (d) correct

*

. The derivative $\frac{\partial\psi(x)}{\partial x}$ of a wave function should be

(a) zero
(b) always continuous
(c) may be discontinuous
(d) discontinuous at the boundary

- Option (a) correct
- Option(b) correct
- Option (c) correct
- Option (d) correct

Back Submit