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Unit 4 - Week 3

Week 3 Assignment 1

The due date for submitting this assignment has passed. **Due on 2017-08-21, 23:55 IST.**

Submitted assignment

Note: More than one option can be correct.

1) Eigen values of Schrodinger wave equation gives *1 point*

- Velocity
- Energy
- Potential
- none of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
Energy

2) Solution of time independent Schrodinger Equation for particle in a box (1D confinement) is given by ("D" is width of well) *1 point*

- $\psi_n(x) = \sqrt{\frac{2}{D}} \sin \frac{n\pi x}{2D}$
- $\psi_n(x) = \sqrt{\frac{2}{D}} \sin \frac{(2n)\pi x}{D}$
- $\psi_n(x) = \sqrt{\frac{2}{D}} \sin \frac{n\pi x}{D}$
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\psi_n(x) = \sqrt{\frac{2}{D}} \sin \frac{n\pi x}{D}$

3) Probability of finding a particle in 1D Infinite Potential well (n=1) is maximum at? *1 point*

- 0.5D
- 0.75D
- .25D
- None of the above
- Photons

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.5D

4) For Square (2D-confinement) potential well, the value of energy is given by? *1 point*

- $E_{l,n} = \frac{(l^2+n^2)^2 \pi^2 \hbar^2}{2mD^2}$
- $E_{l,n} = \frac{(l^2+n^2)^1 \pi^2 \hbar^2}{2mD^2}$
- $E_{l,n} = \frac{(l^2+n^2)^2 \pi^2 \hbar^2}{2mD^3}$
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$E_{l,n} = \frac{(l^2+n^2)^1\pi^2\,\hbar^2}{2mD^2}$$

5) For Square (2D-confinement) potential well, the value of energy is given by *1 point*

- $\psi_{l,n} = C_{l,n}\sin(\frac{n\pi x}{D})\cos(\frac{l\pi y}{D})$
- $\psi_{l,n} = C_{l,n}\sin(\frac{n\pi x}{2D})\cos(\frac{l\pi y}{D})$
- $\psi_{l,n} = C_{l,n}\sin(\frac{n\pi x}{D})\sin(\frac{l\pi y}{D})$
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$\psi_{l,n} = C_{l,n}\sin(\frac{n\pi x}{D})\cos(\frac{l\pi y}{D})$$

6) What is degeneracy? *1 point*

- Having same energy and different mode.
- Same energy level and different wave function.
- Same energy level and same wave function
- Having same energy and same mode.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Having same energy and different mode.
Same energy level and different wave function.

7) Number of degenerate quantum states in 1D confinement (potential well) is *1 point*

- 1
- 0
- 3
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
1

8) Eigen value of Schrodinger wave equation for Harmonic Oscillator is given by *1 point*

- $E_n = h\nu(n+1)$
- $E_n = h\nu\left(n+\frac{1}{2}\right)$
- $E_n = h\nu\left(2n+\frac{1}{2}\right)$
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$E_n = h\nu\left(n+\frac{1}{2}\right)$$

9) Eigen value of Schrodinger wave equation and no. of degenerate states for dia-atomic (rigid rotor) is given by *1 point*

- $E_l = \frac{\hbar^2}{2I}(l+1), g(l) = 2l+1$
- $E_l = \frac{\hbar^2}{2I}l(l+2), g(l) = 2(l+1)$
- $E_l = \frac{\hbar^2}{2I}l(l+1), g(l) = 2l+1$
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$E_l = \frac{\hbar^2}{2I} l(l+1), g(l) = 2l + 1$$

10) Calculate the energy of photon emitted when electron in a Hydrogen atom jumps from n=3 to n=2? *1 point*

- 1.88ev
- 18.8ev
- .188ev
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
1.88ev

11) For Hydrogen atom no. of quantum states for n=3, is given by *1 point*

- 8
- 9
- 18
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
18

12) For 1D Finite potential quantum well, at both boundaries the transmitted wave function and wave function within boundary *1 point*

- Should have same value
- First derivative should have same value
- Second derivative should have value
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
Should have same value
First derivative should have same value

13) Match the following *1 point*

1.Free Particle	A. Potential $\propto x^2$
2.Harmonic Oscillator	B. Periodic Potential
3.Hydrogen atom	C. Zero potential
4.Crystal	D. Potential $\propto$ to 1/r

- 1-C, 2-B, 3-C, 4-D
- 1-B, 2-A, 3-C, 4-D
- 1-C, 2-A, 3-D, 4-B
- 1-D, 2-C, 3-B, 4-A

No, the answer is incorrect.
Score: 0

Accepted Answers:
1-C, 2-A, 3-D, 4-B

14) Match the following *1 point*

	Quantum numbers in solution
1. Particle in a box(infinite well-1D)	A. 3
2. Rigid rotor(rotating system)	B. 1
3. electron in Hydrogen atom	C. 2

- 1-C, 2-B, 3-C
- 1-B, 2-A, 3-C
- 1-C, 2-A, 3-D
- 1-B, 2-C, 3-A

No, the answer is incorrect.
Score: 0

Accepted Answers:
1-B, 2-C, 3-A

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