Ajay Kumar Garg Engineering College, Ghaziabad
Department of Applied Sciences & Humanities
Sessional Test-1

Course: B.Tech
Session: 2024-25
Subject: Engineering Physics
Max Marks: 25

Semester: II
Section: S11-S20
Sub. Code: BAS201
Time: 1 hour

OBE Remarks: All questions are related to CO1.

Q.No	1	2	3	4	5	6	7
CO No.	CO1	CO1	CO1	CO1	CO1	CO1	CO1
Bloom's Level* (L1 to L6)	L3	L2	L2	L4	L5	L4	L5

**Bloom's Level:* L1: Remember, L2: Understand, L3: Apply, L4: Analyze, L5: Evaluate, L6: Create*

Note: Answer **all** the sections.

Section-A

A. Attempt **all** the parts. **(3x2 = 6)**

1. Explain wave particle duality and find the de-Broglie wavelength associated with an electron which is accelerated through 169 volt.(where h = 6.625X 10^{-34}Js, m_0=9.1X10^{-31}kg, q=1.6X10^{-19}C)
2. Explain the concept of wave packet in quantum mechanics. Also prove that phase velocity is greater than velocity of light.
3. Explain Wien's displacement law using black body radiation spectrum.

Section-B

B. Attempt **all** the parts. **(3x4 = 12)**

4. Define phase velocity and group velocity. Derive a relation between V_p & V_g.
5. Explain physical significance of wave function. Derive Time independent Schrodinger's wave equation.
6. What are the postulates of Planck's quantum theory? Write Planck's radiation law and prove that Planck's radiation law approaches to Wien's Radiation law and Rayleigh Jean's law at shorter and longer wavelengths respectively.

Section-C

C. Attempt **all** the parts. **(1x7 = 7)**

7. A particle is enclosed in a one dimensional infinite potential box of width a. Its potential energy is
   $V(x) = 0, if\ 0 < x < a$ and
   $V(x) = \infty, if\ x \leq 0, x \geq a$
   Solving Schrodinger's equation finds the energy eigen values and eigen functions. A particle is moving in one dimensional infinite potential box of width 5Å. Calculate the probability of finding the particle within an interval of 1Å at the center of box when it is in state of least energy. (where Planck's constant, h = 6.625X 10^{-34}Js)

Bandana
Faculty Sign

HoD Sign