

Name Admission No:

ABES Institute of Technology, Ghaziabad

Subject Code: BAS101

Subject Name: Engineering Physics

Year - 1st, Branch-All

2nd ASSIGNMENT (ODD SEMESTER 2024-25)

[Time: 1 Hours]

[Total Marks: 10]

COURSE OUTCOMES

CO	Statements
1	To <i>explain</i> the distribution of energy in black body radiation and to <i>understand</i> the difference in particle and wave nature with explanation of Compton effect and Schrodinger wave equation.
4	To <i>know</i> the functioning of optical fiber and its properties and applications. To <i>understand</i> the concept, properties and applications of Laser.
Date - 22:10:2024 onwards	

(SET-A)

SECTION-A

Q.1	Attempt one Questions. (1×1=1)	CO
a.	<i>Explain</i> Planck's law of black body radiation?	1
b.	<i>Define</i> V number of an optical fibre?	4

SECTION-B

Q.2	Attempt two Questions. (2×3=6)	CO
a.	<i>Calculate</i> the group velocity and phase velocity of an electron whose de Broglie wavelength is 1.2 \AA .	1
b.	<i>Calculate</i> the kinetic energy and de Broglie wavelength of an alpha particle accelerate from rest through a potential difference of 200 volts.	1
c.	There is loss of 3.6 dB optical power in a fibre of length one kilometre. <i>What</i> fraction of its initial intensity remain after 1.5 Km.	4

SECTION-C

Q.3	Attempt one Questions. (1×3=3)	CO
a.	<i>Prove</i> that in a dispersive medium the group velocity of a wave packet is less than the phase velocity and also show that $v_p \cdot v_g = c^2$. where c is the speed of light.	1
b.	<i>Discuss</i> the important factors responsible for absorption and scattering loss of an optical signal.	4

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(SET-B)

SECTION-A

Q.1	Attempt one Questions.	(1×1=1)	CO
a.	<i>Differentiate</i> between phase velocity and group velocity of a wave packet?		1
b.	What is a wave function? Give its interpretation as proposed by Max Born.		1

SECTION-B

Q.2	Attempt two Questions.	(2x3=6)	CO
a.	<i>What</i> is de-Broglie wavelength of matter wave? Show that the wavelength associated with a particle of mass m and kinetic energy E is given by $\lambda = \frac{h}{\sqrt{2mE}}$. <i>Calculate</i> the wavelength of thermal radiation of neutron at 27°C.		1
b.	A single mode fiber has a fiber core of refractive index 1.54 and diameter 10 μm. The cut off parameter is 2.405 and the operating wavelength is 1300 nm. Compute the maximum value of refractive index of cladding and the fractional difference of refractive indices of core and cladding.		4
c.	What do you <i>understand</i> by intermodal and intramodal dispersion in optical fibre? The optical power, after propagating through a fibre of 500m long is reduced to 25% of its initial value. Calculate the fibre loss in dB/Km.		4

SECTION-C

Q.3	Attempt one Questions.	(1x3=3)	CO
a.	<i>Describe</i> Davisson and Germer's experiment to demonstrate the wave character or wave nature of electrons.		1
b.	<i>Discuss</i> the structure, refractive index profile and performance characteristics of step index and graded index fibre.		4