ABES ENGINEERING COLLEGE, GHAZIABAD (AUTONOMOUS)

Mid Term-I (Session: 2025-26)

Roll N[redacted]

Course Name: B. Tech.
Subject Name: Applied Physics
Subject Code: 25AS101

Max. Marks: 15
Time: 75 Minutes
Semester:1

Note:

1. **Keeping Mobile Phone/Any Electronic Gadgets, Even in OFF position is treated as UFM**
2. **Don't Write Anything on Question Paper**
3. **Attempt All Questions**
4. **Assume Any Missing Data if required**

Q. No.	Question	CO	KL	PI
SECTION-A *(Maximum Knowledge Level: K2)*				
1. Attempt All Questions				(1 x 5)
(a)	Explain why quantum mechanics was needed beyond classical mechanics.	CO1	K2	2.4.1
(b)	State one practical example where quantum tunneling occurs.	CO1	K1	2.4.1
(c)	Define quantum bit in quantum computing.	CO1	K1	4.1.1
(d)	Why the properties of bulk material changes drastically in nanoscale ?	CO2	K2	4.1.1
(e)	Mention how nanotechnology can help in air and water purification.	CO2	K1	4.1.1
SECTION-B *(Minimum Knowledge Level: K2)*				
2. Attempt Any two Question				(Same K Levels) (2 x 2)
(a)	A 20 eV electron is incident on a square barrier of height 30 eV. What is the probability that electron tunnel through the barrier if its width is 10^{-9} m.	CO1	K3	2.4.1
(b)	A proton is moving with a speed of 2×10^{8} m/sec. Find the wavelength of wave associated with it.	CO1	K3	2.4.1
(c)	Derive the relation between particle velocity and group velocity.	CO1	K3	4.1.1
SECTION-C *(Minimum Knowledge Level: K3)*				
3. Attempt Any one Question				(Same K Levels) (3 x 1)
(a)	A particle of mass m is represented by the wave function $\psi=A\sin(n\pi x/a)$ in range $0 \le x \le a$, and $\psi=0$ elsewhere. Find the normalized form of the wave function.	CO1	K3	4.1.1
(b)	Briefly describe how quantum cryptography is used to secure the communication.	CO1	K3	4.1.1
4. Attempt Any one Question				(Same K Levels) (3 x 1)
(a)	Explain with the help of diagram the process of fabricating nanomaterial using sol-gel process.	CO2	K3	4.1.1
(b)	Describe the procedure of CVD (Chemical vapor deposition) for producing carbon nanotubes.	CO2	K3	4.1.1

CO Course Outcomes mapped with respective question
KL Bloom's knowledge Level (K1, K2, K3, K4, K5, K6)
K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

ABES ENGINEERING COLLEGE, GHAZIABAD (AUTONOMOUS)

Mid Term-II (Session: 2025-26)

Roll No.: [redacted]

Course Name: B. Tech.
Subject Name: Applied Physics
Subject Code: 25AS101

Max. Marks: 15
Time: 75 Minutes
Semester: I

Note:
1. **Keeping Mobile Phone/Any Electronic Gadgets, Even in OFF position is treated as UFM**
2. **Don't Write Anything on Question Paper**
3. **Attempt All Questions**
4. **Assume Any Missing Data if required**

Q. No.	Question	CO	KL	PI
SECTION-A *(Maximum Knowledge Level: K2)*				
1. Attempt All Questions				(1 x 5)
(a)	What is meant by dark current in a photodiode?	CO3	K1	2.4.1
(b)	Define built in potential of a semiconductor.	CO3	K1	2.4.1
(c)	Explain the mechanism involved in the generation of electron-hole pair in a semiconductor.	CO3	K2	4.1.1
(d)	What is the effect of parallel and antiparallel magnetic orientations on electron transport in a Giant Magnetoresistance device?	CO2	K1	4.1.1
(e)	What is the vortex state in Type II superconductor?	CO2	K1	4.1.1
SECTION-B *(Minimum Knowledge Level: K2)*				
2. Attempt Any two Question				(Same K Levels) (2 x 2)
(a)	If the drift velocity of holes under a field gradient 120V/m is 6.2 m/sec. What is the mobility?	CO3	K3	2.4.1
(b)	An LED is made from GaAs semiconductor with an energy gap of 2.56 eV. Calculate the wavelength of emitted light.	CO3	K3	2.4.1
(c)	Explain the effect of temperature on conductivity of a semiconductor. Also, draw a graph between conductivity and temperature.	CO3	K3	4.1.1
SECTION-C *(Minimum Knowledge Level: K3)*				
3. Attempt Any one Question				(Same K Levels) (3 x 1)
(a)	Prove that in intrinsic semiconductor, the Fermi level lies midway the energy band gap.	CO3	K3	4.1.1
(b)	Explain the working of a solar cell along with the VI characteristics.	CO3	K3	4.1.1
4. Attempt Any one Question				(Same K Levels) (3 x 1)
(a)	Explain Meissner's effect in a superconductor. Prove that a material in its superconducting state is perfectly diamagnetic.	CO2	K3	4.1.1
(b)	Define superconductivity. Calculate the temperature at which the critical magnetic field is two third of the value at 0K for a superconductor with T_c = 4K.	CO2	K3	4.1.1

CO Course Outcomes mapped with respective question
KL Bloom's knowledge Level (K1, K2, K3, K4, K5, K6)
K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create

ABES ENGINEERING COLLEGE, GHAZIABAD (AUTONOMOUS)

Pre - End Term Exam (Session: 2025-26)

Admission No.: [redacted]

Max. Marks: 20
Time: 90 Minutes
Semester: I

Course Name: B. Tech.
Subject Name: Applied Physics
Subject Code: 25AS101

Note:
1. **Keeping Mobile Phone/Any Electronic Gadgets, Even in OFF position is treated as UFM**
2. **Don't Write Anything on Question Paper**
3. **Attempt All Questions**
4. **Assume Any Missing Data if required**

Q. No.	Question	CO	KL	PI
SECTION-A *(Knowledge Level: K2 & K3)*				
Attempt any one part from each question	**(3 Marks x 4 Questions = 12 Marks)**			
1.(a)	Show that EM wave travels with speed of light in free space.	**CO4**	**K2**	**4.1.1**
1.(b)	Explain the concept of displacement current and show how it led to the modification of Ampere's law?	**CO4**	**K2**	**4.1.1**
2.(a)	The earth receives 2.0 calorie/cm^2-min energy from sun on its surface. Determine the amplitude of electric and magnetic field vector.	**CO4**	**K3**	**2.4.1**
2.(b)	Find the skin depth at frequency of 1.6 MHz in aluminium where $\sigma = 38.2 \times 10^6$ mho m and $\mu_r = 1$.	**CO4**	**K3**	**2.4.1**
3.(a)	Explain stimulated absorption, spontaneous emission and stimulated emission mechanisms.	**CO5**	**K2**	**4.1.1**
3.(b)	Differentiate between the various types of fibers on the basis of different types of modes.	**CO5**	**K2**	**4.1.1**
4.(a)	Calculate the fiber loss through the optical fiber when the mean optical power launched into a 5 km length of fiber is 120×10^{-6} W and the mean optical power at receiver is 4×10^{-6}W.	**CO5**	**K3**	**2.4.1**
4.(b)	A step index fibre has core refractive index 1.466, cladding refractive index 1.46. If the operating wavelength of the ray is 0.85 μm, calculate the cut-off parameter and the number of modes which the fibre will support. The diameter of core = 50 μm.	**CO5**	**K3**	**2.4.1**
SECTION-B *(Knowledge Level: K3)*				
Attempt any one part from each question	**(4 Marks x 2 Questions = 8 Marks)**			
5.(a)	Derive the Poynting theorem for the flow of energy in an electromagnetic field. Also give the physical interpretation.	**CO4**	**K3**	**2.4.1**
5.(b)	Derive the differential form of Maxwell's equations. State the physical significance of each equation.	**CO4**	**K3**	**2.4.1**
6.(a)	Explain the construction and working of He-Ne laser with suitable diagrams. Mention the advantages of He-Ne laser over Ruby laser.	**CO5**	**K2**	**2.4.1**
6.(b)	Derive an expression for acceptance angle and numerical aperture. Calculate acceptance angle, critical angle and Numerical aperture if $n_1 = 1.50$ and $n_2 = 1.45$.	**CO5**	**K2**	**4.1.1**

CO Course Outcomes mapped with respective question
KL Bloom's knowledge Level (K1, K2, K3, K4, K5, K6)
K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5-Evaluate, K6-Create