

University of Mumbai
Examination 2020 under cluster No.3 FCRIIT

Program: First Year Engineering

Curriculum Scheme: Rev2019

Examination: FE Semester I

Course Code: FEC102 and Course Name: Engineering Physics-I

Time: 1 and (1/2) hour

Max. Marks: 60

Q1.	Choose the correct option for following questions. All the Questions are compulsory. (2 marks each)
1.	$\frac{d^2\psi}{dx^2} + \frac{2m}{\hbar^2} (E-V) \psi=0$ <p>This equation represents</p>
Option A:	Schrödinger's time dependent equation
Option B:	Schrödinger's time independent equation
Option C:	Heisenberg's Equation
Option D:	De-Broglie's equation
2.	What is the resistivity of intrinsic Ge at 300k? (Given the density of carriers as $2.5 \times 10^{19}/m^3$, $\mu_e = 0.39$ and $\mu_h = 0.19$)
Option A:	0.53 Ω m
Option B:	0.82 Ω m
Option C:	0.43 Ω m
Option D:	1.39 Ω m
3.	The refractive index of the material of Anti-reflection coating should be _____ the substrate.
Option A:	less than
Option B:	greater than
Option C:	equal to
Option D:	Less than or greater than
4.	What are the intercepts of the plane whose miller indices is (0 0 1)?
Option A:	$x=a, y=a, z= a$
Option B:	$x=\infty, y=\infty, z= a$
Option C:	$x=a, y= a, z= \infty$
Option D:	$x=\infty, y=a, z= a$
5.	In case of super conduction at transition temperature, the electrical resistance of a material
Option A:	Is large.
Option B:	Is less.
Option C:	Vanishes.

Option D:	Remains the same.
6.	A particle is confined in a box of length 10^{-7} m. The minimum uncertainty in its momentum will be
Option A:	$\hbar \times 10^{-7}$ kg m/s
Option B:	$\hbar \times 10^7$ kg m/s
Option C:	$\hbar \times 10^{-7}$ g m/s
Option D:	$\hbar \times 10^7$ g m/s
7.	If acceptor impurity is added to an intrinsic semiconductor, it results into
Option A:	P-type semiconductor
Option B:	N-type semiconductor
Option C:	P-N junction
Option D:	P-type or N-type semiconductor.
8.	In Newton's rings, the diameter of _____ are proportional to the square roots of natural numbers
Option A:	Bright rings
Option B:	Dark rings
Option C:	Both bright and dark rings
Option D:	Neither bright rings nor dark rings
9.	What is the full-form of GMR?
Option A:	Giant Magneto reluctance
Option B:	Gaseous Magnetoresistance
Option C:	Giant Magnetoresistance
Option D:	Great Magnetoresistor
10.	In Bragg's equation $2d \sin\theta = n\lambda$, what does ' θ ' represent?
Option A:	Angle of diffraction
Option B:	Glancing angle
Option C:	Critical angle
Option D:	Reflection angle
11.	Which of the following is the correct expression for Heisenberg's Uncertainty Principle?
Option A:	$\Delta x \Delta p_x \leq \hbar$
Option B:	$\Delta t \Delta E \geq \hbar$
Option C:	$\Delta t \Delta x \geq \hbar$
Option D:	$\Delta L \Delta x \leq \hbar$
12.	The mobility of electrons is _____ that of holes
Option A:	Less than
Option B:	Equal to
Option C:	Larger than
Option D:	Less than or greater than

13.	If reflected light of wavelength $\lambda = 5900\text{\AA}$ is used to observe Newton's ring, the diameter of 10th dark ring is 0.5 cm then the radius of curvature of the lens is
Option A:	2.05 cm
Option B:	1.059 m
Option C:	1.59 m
Option D:	1.95m
14.	Plates of supercapacitors are coated with porous material for
Option A:	Protecting plates from damage
Option B:	Giving porous texture to plates
Option C:	Increasing surface area for storage
Option D:	Decreasing surface for storage
15.	Which is not a type of liquid crystal in the following?
Option A:	Thermotropic
Option B:	Anisotropic
Option C:	Metalotropic
Option D:	Lyotropic

Q2	Solve any Three. (5 marks each)
A	When an electron is accelerated through a potential difference of 10000 V, what is wavelength of the wave the electron is associated with?
B	What are crystal planes and miller indices? Draw the planes (110) and $\left(\frac{1}{2} \frac{1}{2} 1\right)$ in a cube.
C	Explain the principle, construction and working of a LED.
D	Derive the expression for the diameters of the Bright Newton's rings when viewed in Reflected light.
E	What is Meissner effect? Show that in the superconducting state, the material is perfectly diamagnetic with the help of proper equations.

Q3.	Solve any Three. (5 marks each)
A	Using Uncertainty principle, show that electrons cannot exist within the nucleus.
B	Differentiate between Direct and Indirect semiconductors.
C	A mixture of red light of wavelength 6600\AA and blue light of wavelength 4400\AA is incident normally on an air film formed by two glasses plates. The

	thickness of the air film is 3300\AA . What is the color of light reflected by the air film?
D	What is a super capacitor? What are the advantages of using supercapacitor instead of battery?
E	Define Multiferroics. Differentiate between Type I and Type II multiferroics.

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	B
Q2.	C
Q3.	A
Q4	B
Q5	C
Q6	B
Q7	A
Q8.	B
Q9.	C
Q10.	B
Q11.	B
Q12.	C
Q13.	B
Q14.	C
Q15.	B