**G. H. Raisoni Institute of Engineering & Technology, Wagholi,Pune**
**Department of First Year Engineering**
**Question bank**

**Engineering Physics**

| Q. No | Unit I | CO |
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| 1 | Explain how an electron beam can be made to bend either towards or away from the normal to an equipotential surface. | **CO1** |
| 2 | Electron accelerated by a potential of 250 V enter the electric field at an angle of incidence $45^o$ and get reflected through an angle of $30^o$. Find the potential difference between two regions. | **CO1** |
| 3 | Derive an expression for the displacement produced when an electric field acts parallel to electron motion. | **CO1** |
| 4 | Draw block diagram of CRO. Write down the name of seven basic sections of CRO | **CO1** |
| 5 | Write down four applications of CRO. | **CO1** |
| 6 | Draw ray diagram of bending of electron beam at curved equipotential surfaces. | **CO1** |
| 7 | Write down expression for the displacement produced when an electric field acts parallel and perpendicular to electron motion. | **CO1** |
| 8 | What is deflection sensitivity? Give an expression for deflection sensitivity. | **CO1** |
| 9 | What is an electron lens? Compare between electron lens and optical lens. | **CO1** |
| | **Unit II** | |
| 1 | Obtain the equation of path difference between the reflected rays, when the monochromatic light is incident on uniform thickness film. Also derive conditions of brightness and darkness for reflected rays. | **CO2** |
| 2 | Write down the conditions of brightness and darkness for a monochromatic light beam transmitted from a thin parallel film of transparent material. | **CO2** |
| 3 | Explain how the phenomenon of interference is utilized in testing the optical flatness of transparent surface. | **CO2** |
| 4 | Explain with diagram how interference principle is used to design antireflection coating | **CO2** |
| 5 | A Monochromatic light emitted by a broad source of wavelength 5800 Å falls normally on two plates of glass which enclosed a wedge shape film. The plates touch at one end are separated at a point 15 cm from that end by a wire of diameter 0.05 mm. Find the fringe width. | **CO2** |
| 6 | A parallel beam of light $\lambda$ = 5890 Å is incident on glass plate of refractive index $\mu$= 1.5 such that angle of refraction in to plate is $60^0$. Calculate the smallest thickness of the plate which will make it appear dark by reflection. | **CO2** |

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| 7 | A soap film of refractive index μ= 4/3 and thickness $1.5*10^{-4}$ cm is illuminated by white light incident at angle $45^0$, The light reflected by it is examined by spectroscope in which it is found a dark band corresponding to wavelength of 5000 Å. Calculate order of interference band. | **CO2** |
| | **Unit III** | |
| 1 | Write down full form of LASER. What are the different types of LASER. | **CO3** |
| 2 | What are the characteristics of LASER. | **CO3** |
| 3 | Define following term (1) Stimulated emission (2) Population inversion (3) Spontaneous emission | **CO3** |
| 4 | List any four applications of LASER and discuss any one of them. | **CO3** |
| 5 | Differentiate between Normal photography and Holography and Why Laser is used in Holography. | **CO3** |
| 6 | What is Hologram and discuss process of Reconstruction of image in Holography. | **CO3** |
| 7 | Explain construction and working principal of He-Ne Laser using energy level diagram. | **CO3** |
| 8 | Define Pumping. Which pumping mechanism is used in He- Ne laser & Semiconductor diode laser? | **CO3** |
| 9 | Define Holography and explain recording of image in Holography. | **CO3** |
| 10 | Define following terms (i) Meta stable state (ii) Optical resonator. | **CO3** |
| | **Unit IV** | |
| 1 | Derive the expression for the conductivity of intrinsic and extrinsic semiconductor. | **CO4** |
| 2 | Define Fermi level of semiconductor. Plot the variation of Fermi level with the increase of temperature for n-type and p-type semiconductor. | **CO4** |
| 3 | What is the effect of following factors on the conductivity of semiconductors?<br>i) Increase in impurity of concentration ii) Increase in temperature | **CO4** |
| 4 | Draw energy band picture for P-N junction in case of<br>(i)Zero Bias (ii) Forward Bias (iii) Reverse Bias | **CO4** |
| 5 | What is Fermi level? Show the position of Fermi level in P-type semiconductor at temperature T = 0 K and T > 0 K. | **CO4** |
| 6 | Define Hall effect. Derive the expression of Hall coefficient. | **CO4** |
| 7 | Calculate the conductivity of pure silicon at room temperature when the concentration of charge carriers is 1.6 x1010/$cm^3$. Given that, μe = 1500 $cm^2$/V sec, μh=500 $cm^2$/V sec. | **CO4** |

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| 8 | The Hall coefficient of a specimen of doped silicon is found to be 3.66 x 10 $m^{-3}$/ C. The resistivity of the specimen is 8.93 x $10^{-3}$ Ohm m. Determine the mobility of the charge carriers. | **CO4** |
| 9 | Discuss following terms related to Solar cell<br>(i) Fill factor of Solar cell (ii) Short circuit current (iii) Open circuit voltage | **CO4** |
| 10 | What is photovoltaic effect? Explain I-V characteristics of Solar cell. | **CO4** |
| 11 | Define Fermi level of semiconductor. Plot the variation of Fermi level with the increase in doping concentration for n-type and p-type semiconductor. | **CO4** |
| 12 | Discuss construction and working principle of LED. | **CO4** |
| 13 | Define OLED. Discuss advantages of OLED over LCD | **CO4** |
| 14 | List few applications of p-i-n photodiode. | **CO4** |
| | **Unit V** | |
| 1 | State De Broglie's Hypothesis. Hence obtain the relation for DeBroglie's Wave Length in terms of Energy. | **CO5** |
| 2 | What is wave function? Explain physical significance of $\Psi$ and $\|\Psi\|^2$. | **CO5** |
| 3 | An electron is bounded by an infinite potential well of width 2×10–8cm. Calculate the lowest two permissible energies of an electron.(Given : h = 6.64 × $10^{-34}$ J. sec., m = 9.1 × $10^{-31}$kg). | **CO5** |
| 4 | Write down Schrödinger's time independent and dependent Wave Equations. | **CO5** |
| 5 | Derive an expression for energy of a particle trapped in an infinite potential well. | **CO5** |
| 6 | State and explain De Broglie's hypothesis of matter waves. State any two properties of matter waves. | **CO5** |
| 7 | The uncertainty in the location of the particle is equal to its DeBroglie wavelength. Show that the uncertainty in the velocity of the a particle is equal to the particle velocity itself. | **CO5** |
| 8 | State and explain Heisenberg's Uncertainty principle. Show that it is also applicable for energy and time | **CO5** |
| 9 | The position and momentum of 1 kev electron are simultaneously measured. If its position is located within 1Ao. Find the percentage of uncertainty in its momentum.(Given : h = 6.64 × | **CO5** |
| 10 | Starting from, $\lambda = h/mv$. Obtain $\lambda = h/\sqrt{2mE}$, where E is KE of the particle. | **CO5** |
| 11 | Calculate the De-Broglie wavelength associated with 1 Mev proton (mp=1.67x$10^{-27}$ kg). | **CO5** |
| 12 | Explain any two properties of nanoparticles. | **CO5** |
| 13 | Explain in brief, working of Scanning Tunneling Microscope (STM). | **CO5** |

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| 14 | What accelerating potential would be required for a proton with zero initial velocity to acquire a velocity corresponding to its de- Broglie wavelength of $10^{-10}$ m. [Given: mp = $1.67\times10^{-27}$ kg]. | **CO5** |