QUESTION BANK

Title of the Subject: Engg.Physics	
Title of the Unit: Oscillation, Ultrasonic's and Dielectric Materials	**Unit No:- one**

Multiple Choice Questions		
Question No.	**Question Description**	**Expected Marks**
1.	Which of following material has least value of dielectric constant? A. Oil B. Paper C. Glass D. Ceramic	**1 mark**
2	Class of dielectric material which exhibit a hysteresis loop of polarization versus electric field is termed as **A. ferroelectrics** B. electric C. ferrites D. dipole	**1 mark**
3	Over-damping results in **A. slower return to equilibrium** B. faster return to equilibrium C. equilibrium is never achieved D. arrhythmic return to equilibrium	**1 mark**

4	A force that acts to return the mass to it's equilibrium position is called A. frictional force **B. restoring force** C. normal force D. contact force	**1 mark**
5	Velocity at equilibrium position is A. constant B. minimum **C. maximum** D. zero	**1 mark**
6	If an object moves back and forth repeatedly around a mean position it is called **A. oscillating** B. revolving C. rotating D. motion	**1 mark**
7	Ultrasonic waves are A Longitudinal B Transverse C Longitudinal and transverse both D Electromagnetic waves	**1 mark**
8	The full form of SONAR application of ultrasonic waves is, A Sound navigation and recalling B Sound navigation and rebounding C Sound navigation and recursion D Sound navigation and ranging	**1 mark**
9	When a rod of ferromagnetic material, is kept in a magnetic field parallel to its length, the rod suffers a change in its length. This phenomenon is known as, A ferroelectric effect B Paraelectric effect C Piezoelectric effect D Magnetostriction effect	**1mark**

10	The frequency of ultrasonics is A Below 20Hz B Between 20Hz to 20,000 Hz C Above 20,000 Hz D 0	**1 mark**

Short Answer Question

Question No.	**Question Description**	**Expected Marks**
1	Definition of ultrasonic wave	**2 marks**
2	What is SONAR? How it is used?	**2 marks**
3	State the Properties of Ultrasonic Waves.	**2 marks**
4	State the applications of Ultrasonic Waves.	**2 marks**
5	What is Piezoelectric and Magnetostriction Effect?	**2 marks**
6	Define the Term Dielectric Strength and Dielectric Constant.	**2 marks**
7	What is dielectric polarization?	**2 marks**
8	Describe any two uses of dielectric material in detail.	**2 marks**
9	Define the term Dielectrics.	**2 marks**
10	Calculate the natural frequency of cast iron of 2.6 cm in length. Density of rod = 7.23 X 103 kg/m3 Young's modulus = 1.16 X 1011 N/m2	**2 marks**

11	Calculate the natural frequency of 40 mm length of a pure iron rod. Given the density of pure iron is 7.25 X 103 kg/m3 and its Young's Modulus is 115 X 109 N/m2. Can you use it in magnetostriction oscillator to produce ultrasonic waves?	**2 marks**

Long Answer Question		
Question No.	**Question Description**	**Expected Marks**
1	Which are the forces involved in Forced Oscillations ? Obtain the differential equation of forced oscillations.	**6 marks**
2	Discuss the condition of resonance and explain sharpness of resonance.	**6 marks**
3	Set up differential equation for free oscillation and find general solution .	**6 marks**
4	Obtain the differential equation of wave motion.	**6 marks**
5	Explain with neat circuit diagram the generation of ultrasonic waves by magnetostriction oscillator method.	**6 marks**
6	Explain with neat circuit diagram the generation of ultrasonic waves by piezoelectric oscillator method.	**6 marks**
7	What are the different types of dielectric materials? Explain them in detail	**6 marks**
8	Describe the possible mechanism of polarization in a dielectric material.	**6 marks**
9	Describe any two uses of dielectric material in detail.	**6 marks**
10	Set up differential equation for damped oscillation and find general solution of it.	**6 marks**

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QUESTION BANK

Title of the Subject:	
Title of the Unit: Optics, Fibre Optics and Laser	**Unit No:- TWO**

Multiple Choice Questions		
Question No.	**Question Description**	**Expected Marks**
1	The emission responsible for producing laser is, A Spontaneous emission B Stimulated emission C ultraviolet emission D non radiative emission	**1 mark**
2	Ruby laser is a_ _ _ _ _ _ _ _ A Gaseous laser B Solid state laser C Semiconductor laser D None of the above	**1 mark**
3	In He-Ne laser system, the helium and neon gases respectively maintained at a ratio A 1:5 B 1:1 C 1:10 D 10:1	**1 mark**

4	An optical fiber is based on the principal of A polarization of light B total internal reflection C interference of two beams D diffraction of light	**1 mark**
5	In step index fiber, the refractive index A Remains constant at core cladding interface B Decreases parabolically along the radius of the core C Increases linearly thorough the core D Changes abruptly at the core cladding interface	**1 mark**
6	A number which defines the light gathering capacity of an optical fiber is known as A numerical aperture B Acceptance angle C Acceptance cone D None of these	**1 mark**
7	Constructive interference happens when two waves are A. out of phase B. zero amplitude C. in phase D. in front	**1 mark**
8	Extra distance travelled by one of waves compared with other is called A. path B. displacement C. phase difference D. path difference	**1 mark**
9	The transverse wave nature of light is established by the phenomenon of _____ a) Interference b) Refraction c) Diffraction d) Polarization	**1 mark**
10	For optical fiber to transmit the signal, the necessary condition is given by A refractive index of core should be less than refractive index of cladding B refractive index of core should be greater than refractive index of	**1 mark**

	cladding C refractive index of core should b equal to the refractive index of cladding D refractive indices of core and cladding can be arbitrary	

Short Answer Question

Question No.	Question Description	2 mark
1	What is Interference? State its types..	2 mark
2	Write any two Engineering Applications of laser.	2 mark
3	What is Population Inversion? Why it is necessary for Lasing Action?	2 mark
4	Explain the concept of metastable state in LASER.	2 mark
5	What is laser? Write the characteristics of laser.	2 mark
6	Write any two applications of optical Fiber.	2mark
7	Draw typical diagram for Fiber Optics.	2 mark
8	Define the term Optical Activity and Specific Rotation.	2 mark
9	Explain the term spontaneous and simulated emission	2mark
10	Distinguish between positive and negative crystal.	2 mark

Long Answer Question

Question No.	Question Description	Expected Marks
1	What is Acceptance angle and Acceptance cone? A fiber cable has an acceptance angle of 30^0 and core index of refraction is 1.4, calculate the refractive index of cladding.	6 marks
2	Derive an expression for the optical path difference for the reflected rays in a thin film of constant thickness and hence find the conditions for maxima and minima	6 marks

3	What is double refraction? Explain the difference between ordinary ray (O-ray). and extra ordinary ray (e-ray).	**6 marks**
4	Explain the working, construction and energy level diagram for He-Ne laser.	**6 marks**
5	Explain Huygen's theory of double refraction .	**6 marks**
6	Explain the construction and working of a Ruby Laser.	**6 marks**
7	Write a short note on Laurent's halt shade polarimeter.	**6 marks**
8	Explain the appearance of Newtons rings by reflected eight .	**6 marks**
9	State and explain Brewster's law and show that the angle between reflected and refracted ray is 90^0 .With a slab of flint glass the angle of polarization is found to be $62^0 24'$. Calculate the refractive index of the flint glass.	**6 marks**

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QUESTION BANK

Title of the Subject:	
Title of the Unit: Electron Optics, Nuclear Physics and Quantum Mechanics	**Unit No:- Three (3)**

Multiple Choice Questions		
Question No.	**Question Description**	**Expected Marks**
1	Hall voltage is directly proportional to A. current	**1 mark**

	B. electric field C. magnetic flux density D. all of above	
2	For an electron, magnitude of force on it is A. BeV B. eV C. Be D. BV	**1 mark**
3	Quantum of electromagnetic energy is called A. particles B. photons C. waves D. energy	**1 mark**
4	In 1909, Millikan devised technique for measurement of **A. charge on electron** B. charge on cathode C. charge on neutron D. charge on proton	**1 mark**
5	By magnetic field cathode rays are deflected in **A. circular path** B. straight path C. curved path D. round path	**1 mark**
6	**In isotope** A.Number of electrons = Number of protons B.They have different chemical properties C.They have different atomic number D.They have different mass number	**1 mark**
7.	In a fission reactor, which particle causes a Uranium-235 nucleus to split? A.neutron	**1 mark**

	B.Proton C. alpha-particle D.gamma ray		

Short Answer Question

Question No.	Question Description	Expected Marks
1	State De-Broglie's hypothesis of Matter wave.	**2 mark**
2	An electron is accelerated through 1000 volts and is reflected from a crystal The first order reflection occurs when glancing angle is 70^0. Calculate interplaner spacing of a crystal.	**2mark**
3	An electron entering a magnetic field of 10^{-2} wb/m2 with a velocity of 10^7 m/s describes a circle of radius 6 X 10-3 m, calculate e/m of an electron.	**2 mark**
4	Explain physical significance of wave function.	**2 mark**

Long Answer Question

Question No.	Question Description	Expected Marks
1	With neat diagram explain principle and working of Bainbridge Mass Spectrograph	**6 marks**
2	Derive the time independent Schrodinger's wave equation.	**6 marks**
3	Write down the Schrödinger's time independent wave equation	**6 marks**
4	State Heisenberg's Uncertainty Principle. Prove electron cannot exist in the Nucleus.	**6 marks**
6	Explain the construction and working of G.M. counter	**6 marks**
7	Describe Millikan's oil drop method for the determination of electronic charge.	**6 marks**
8	Using Thomson method calculate ratio of charge on electron to its mass.	**6 marks**

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QUESTION BANK

Title of the Subject:	
Title of the Unit: Crystal Structure, X-rays and Electrodynamics	**Unit No:- Four (4)**

Multiple Choice Questions		
Question No.	**Question Description**	**Expected Marks**
1	In crystal lattice ions are arranged in A. two dimensions B. four dimensions **C. three dimensions** D. single dimension	**1 mark**
2	Crystal lattice is also known as A. lattice triangle **B. space lattice** C. lattice line D. lattice array	**1 mark**
3	Coordination number in simple cubic crystal structure (a) 1 (**b) 2** (c) 3 (d) 4	**1 mark**
4	The atomic diameter of an BCC crystal (if a is lattice parameter) is (a) a (b) a/2 (c**) a/(4/√3)** (d) a/(4/√2)	**1 mark**
5	The number of crystal systems is A]5 b]7 c]14 d]21	**1 mark**
6	A cubic crystal system is represented by: ( ) *A]* $a = b = c,\ \alpha = \beta = \gamma \neq 90°$ *B]* $a = b \neq c\ ,\alpha = \beta = \gamma = 90°$ *C]* $a = b = c,\ \alpha = \beta = \gamma = 90°$ *D]* $a \neq b \neq c\ ,\alpha = \beta = \gamma = 90°$	**1 mark**

7	The number of Bravais lattices is A]256 B]7 C]14 D]37	**1 mark**
8	If fast moving electrons rapidly decelerate, then rays produced are A. alpha rays B. beta rays C. gamma rays D. x-rays	**1 mark**
9	X-rays have A. short wavelength B. high frequency C. both A and B D. longest wavelength	**1 mark**
10	Type of x-rays used to detect break in bone is A. hard B. soft C. both A and B D. moderate	**1 mark**

Short Answer Question

Question No.	**Question Description**	**Expected Marks**
1	Give any two engineering applications of X-Rays.	**2 mark**
2	Define the term Unit Cell.	**2mark**

3	State Bragg's law in X-ray diffraction	**2 mark**
4	State Heisenberg's Uncertainty Principle	**2mark**
5	Lead exhibits FCC structure. Each side of unit cell is of 4.95 A0 Calculate radius of lead atom.	**2 mark**
6	An X-ray is operated at 20 kv. Calculate the minimum wavelength of X-rays emitting from it.	**2 mark**

Long Answer Question

Question No.	Question Description	Expected Marks
1	What are the types of X-Rays spectra? How do we get the continuous and sharp line spectrum of X- Rays?	**6 marks**
2	Define atomic radius. Calculate atomic radii in SC, BCC and FCC lattices with suitable diagrams.	**6 marks**
3	Derive the relation between interplaner spacing 'd ' defined by Miller Indices (hkl) and lattice parameter 'a '. Calculate the interplaner spacing for (220) plane where the lattice constant is 4.938 A^0.	**6 marks**
4	Explain Bragg's law. Derive the Bragg's equation for diffraction of X-Rays and discuss its application in X-Ray Crystallography	**6 marks**
5	Define packing density . Find the packing density in sc ,bcc and fcc lattices.	**6 marks**
6	Derive the relation between crystal density 'p' and lattice constant 'a' .the density of copper is 8980kg/m^3 and unit cell dimension is 3.61A^0. Atomic weight of copper is 63.54.Determine crystal structure.	**6 marks**
7	What is displacement current ? Write Maxwell's equations in differenetial and integral form**.**	**6 marks**
8	State and derive Moseley's law for characteristics X-ray spectrum.	**6 marks**

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QUESTION BANK

Title of the Subject:	
Title of the Unit: Magnetic, Superconducting and Semiconducting materials	**Unit No:- 5 (Five)**

Multiple Choice Questions		
Question No.	**Question Description**	**Expected Marks**
1	Units for magnetic flux density (a) Wb / m2 (b) Wb / A.m (c) A / m (d) Tesla / m	**1 mark**
2	**.The material which exhibits hysteresis is** diamagnetic paramagnetic ferromagnetic ceramic	**1 mark**
3	**In superconductivity the conductivity of a material becomes** Zero Finite Infinite None of the abov	**1 mark**

4	**The superconducting state is perfectly _____ in nature.** Diamagnetic Paramagnetic Ferromagnetic Ferromagnetic	**1 mark**
5	When temperature increases, intrinsic concentration increases which results in increase of A. conductivity B. conductivity C. capacitivity D. infinite	**1 mark**
6	Energy gap is overlapped between Valence band and conduction band in A. insulators B. conductors C. semiconductors D. super semiconductors	**1 mark**
7	Which of the following is not a trivalent impurity atom? A. Boron B. Indium C. Gallium D. Phosphorous	**1 mark**
8	Semiconductor material doped with penta Valent impurity is called A. n-type B. p-type C. neutral-type D. intrinsic-type	**1 mark**
9	If metal or semiconductor carrying current is placed in a magnetic field perpendicular to current, an electric field is induced in direction perpendicular to both current and magnetic field. This phenomena is	**1 mark**

	known as A. Chemical Effect B. Toxicity C. Halls Effect D. Blister	
10	Strength of magnetic field is known as A. flux B. density C. magnetic strength D. magnetic flux density	**1 mark**

Short Answer Question

Question No.	**Question Description**	**Expected Marks**
1	Write any two applications of Superconductors.	**2 mark**
2	What is the effect of Magnetic field on Superconductors?	**2mark**
3	What is microscopic Ohm's Law.	**2 mark**
4	What is Hall Effect.	**2 mark**

Long Answer Question

Question No.	**Question Description**	**Expected Marks**
1	Define magnetic materials. Classify diamagnetic, paramagnetic and ferromagnetic materials in detail giving their differences.	**6 marks**
2	Prove Bohr magneton $\mu = eh/2m$.Define and distinguish between hard and soft magnetic materials.	**6 marks**
3	On the basis of domain theory explain B-H curve and hence explain retentively and coercively.	**6 marks**

4	What is Superconductivity? Explain Meissner Effect in Superconductors.	**6 marks**
5	Derive an expression for electromagnetic wave in free space and hence calculate the value of velocity of light in free space.	**6 marks**
6	Explain type – I and type – II superconductor	**6 marks**
7	Derive an expression for conductivity in an intrinsic and extrinsic semiconductor.Calculate conductivity of pure silicon when concentration of carriers is $1.6 * 10^{10} cm^3$. $\mu = 1500 cm^2/v\_s$, $\mu_h = 500\ cm^2 /V\_S$.	**6 marks**