SEAT No._____

[A-17]

SARDAR PATEL UNIVERSITY
Fourth Semester B.Sc. EXAMINATION
(Under CBCS) June 2010 Batch
Wednesday, 11th April-2018
Time: 10:00 am to 01:00 pm
PHYSICS – US04CPHY01
Optics, Spectroscopy, Electrostatics & Magnetism

N.B: Figures on the right indicate maximum marks.   Total Marks: 70

Q.1   **Answer the following MCQ by choosing correct option.**   **(10)**

1   The phenomenon in which vibrations of electric field vector of light are confined to one direction is known as _____.
(a)   Polarization   (b)   Reflection
(c)   Diffraction   (d)   refraction

2   _____ is a positive crystal.
(a)   Calcite   (b)   lead
(C)   Sodium   (d)   Quartz

3   The phase difference between the components of elliptically polarized light is _____.
(a)   0   (b) Π
(C) $\Pi/2$ (d) $\Pi/4$

4   The half wave plate introduces the path difference of _____ between extra ordinary and ordinary ray.
(a) $\lambda/4$ (b) $3\lambda/4$
(C) λ (d) $\lambda/2$

5   In electromagnetic spectrum, the region of ultra-violet is lying between __ & __ regions.
(a)   X-rays, Visible   (b)   IR, Microwave
(C)   Visible, Infrared   (d)   Microwave, Radiowave

6   Molecular spectra are also known as _____.
(a)   Atomic   (b)   line
(C)   Band   (d)   X-rays

7   The splitting of energy level of an atom when it is placed in electric field is known as _____.
(a)   Zeeman effect   (b)   Stark effect
(c)   Raman effect   (d)   None of these

8   Electric lines of force about a negative point charge are _____.
(a)   Radial, inwards   (b)   Circular, clockwise
(C)   Circular, anticlockwise   (d)   Radial, outwards

9   The divergence of magnetic field B is _____.
(a)   -1   (b)   infinity
(C)   Zero   (d)   1

10   The material which gets repelled when the magnetic field is applied, is known as _____ material.
(a)   Ferromagnetic   (b)   Diamagnetic
(c)   Paramagnetic   (d)   None of these

CP, T, O.)

Q.2		Give short answers to the following questions. (Attempt any Six)	(12)
	1	Distinguish between polarized and unpolarized light.	
	2	What are quarter wave plates and half wave plates?	
	3	Explain briefly different techniques used for the investigation of spectra.	
	4	Write any two properties of X-rays.	
	5	Write Poisson's and Laplace's equation.	
	6	What is a Non-rigid rotator?	
	7	State Coulomb's law and give the expression for Coulomb's force.	
	8	Distinguish between diamagnetic, paramagnetic and ferromagnetic materials.	

Q.3	(a)	What is double refraction? State the properties of e-ray and o-ray.	[04]
	(b)	Explain the polarization by reflection through the transparent medium.	[04]

OR

Q.3	(a)	Write a note on Nicol prism.	[04]
	(b)	Explain in brief: Polarization by reflection.	[04]

Q.4	(a)	Discuss the experimental arrangement for production and detection of circularly polarized light.	[05]
	(b)	Give Hygen's explanation of double refraction in a uniaxial crystal.	[03]

OR

Q.4	(a)	Explain the theory of superposition of waves which are linearly polarized at right angles.	[05]
	(b)	What are wave plates? Which materials are used to make them?	[03]

Q.5	(a)	What is Zeeman effect? Explain anomalous Zeeman effect.	[05]
	(b)	Write a note on L-S coupling scheme.	[03]

OR

Q.5	(a)	With necessary diagram explain the Coolidge tube method for production of X-rays.	[05]
	(b)	Enlist the properties of X-rays.	[03]

Q.6	(a)	What are rotational spectra? Explain isotope effect in it.	[04]
	(b)	Explain isotope effect in rotational spectra.	[04]

OR

Q.6	(a)	What is Raman effect? Explain its salient features.	[04]
	(b)	Discuss various regions of molecular spectra.	[04]

Q.7	(a)	State and explain Gauss's law in differential form.	[05]
	(b)	Define electric potential and give comments on it.	[03]

OR

Q.7	(a)	Define electric potential and obtain the relation $\vec{E} = -\vec{\nabla}V$.	[05]
	(b)	Using Gauss's law in differential form, obtain Poisson's equation and Laplace equation.	[03]

Q.8	(a)	Discuss divergence and curl of magnetic field using Biot-Savart law.	[05]
	(b)	Write a note on ferromagnetic materials.	[03]

OR

Q.8	(a)	Obtain an expression for torque on a rectangular current loop in a uniform field $\vec{B}$.	[05]
	(b)	Give the difference between magnetostatics and electrostatics.	[03]

*****