Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III • EXAMINATION – SUMMER 2013

Subject Code: 133503 **Date: 29-05-2013**

Subject Name: Applied Physics

Time: 02.30 pm - 05.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Write a short note on the photoelectric effect. Derive an expression of the photoelectric equation using Einsteinôs theory.	**07**
	(b)	Define the de-Broglie concept of matter waves. Describe an experiment to show that the electrons in motion exhibit wavelike properties.	**07**
Q.2	**(a)**	Write a note on the scientific instrumentation required for the measurement of the color.	**07**
	(b)	Describe the effect of transverse and longitudinal electric field on the motion of the charged particles. Obtain the expression for the linear deflection.	**07**
		OR	
	(b)	Derive the general expression of time independent Schrödinger wave equation in 3 dimensions. Describe all the notations used.	**07**
Q.3	**(a)**	(i) Describe Bain bridge mass spectrograph and its working.	**05**
		(ii)The path followed by a charged particle under the magnetic field alone would be _____ and in a crossed electric and magnetic field would be _____.	**02**
	(b)	(i) A rod PQ of length *l* moves with a uniform velocity *v* parallel to a long straight wire, carrying a current *i*. What is the *emf* induced across the two ends of the rod?	**02**
		(ii)A fan blade of length *2a* rotates with frequency *f* cycles per second perpendicular to the magnetic field B. Find the potential difference between the centre and the end of the blades.	**02**
		(iii) Draw a neat diagram of the construction of CRO.	**03**
		OR	
Q.3	**(a)**	(i) Write a short note on a light source and an illuminant with examples.	**04**
		(ii) Write a short note on color rendering index with examples.	**03**
	(b)	(i)What is a black body radiator?	**01**
		(ii)Explain - ñthe color of the light emitted by a radiator depend on its temperatureò.	**05**
		(iii)What does ñ65ò mean in D65?	**01**
Q.4	**(a)**	In Compton effect, considering the elastic collision between a photon and a free electron, write down equations of energy and momentum conservation.	**07**
	(b)	(i) An electron and a 150gm baseball are travelling at 220m/s measured to an accuracy of 0.065%. Calculate and compare uncertainty in position of each of the bodies.	**04**
		(ii) Explain the physical significance of γ-function.	**03**
		OR	
Q.4	**(a)**	Describe the color mixing laws in detail.	**07**
	(b)	Write a note on color matching in textile.	**07**
Q.5	**(a)**	(i) Find the de Broglie wavelength of (i) an electron accelerated through a potential difference of 182 volts, and (ii) a 1 kg object moving with a speed of 1m/s. Comparing the results explain why the wave nature of matter is not more	**04**

apparent in daily observations.

(ii) If the incident radiation is 1.372Å, find the wavelength of scattered radiation at angle of 30° and also the velocity of the recoiled electron. **03**

(b) (i) Describe the construction of cyclotron and explain its working. Why can it not be used to accelerate electrons to very high velocities? **05**

(ii) Define Lorentz force. **01**

(iii)Astonôs mass spectrograph is used for _____. **01**

OR

Q.5 **(a)** (i) What are the basic components of color perception? Define luminosity. **02**

(ii) State the uncertainty principle. **01**

(iii) Light of wavelength 3500 Å falls on a Potassium surface with work function 2.2 eV. Calculate (i) maximum energy of photoelectrons in electron volts (ii) threshold wavelength and (iii) stopping potential. **04**

(b) (i) What is magnetic focusing? Write its application in mass spectrograph. **03**

(ii)Describe the characteristic properties of light particles. **04**

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