Enrolment No.

## GUJARAT TECHNOLOGICAL UNIVERSITY **BE – SEMESTER – III • EXAMINATION – SUMMER 2015**

## Subject Code: 133503 **Subject Name: Applied Physics** Time: 02.30pm-05.00pm **Total Marks: 70** Instructions: 1. Attempt all questions. 2. Make suitable assumptions wherever necessary. 3. Figures to the right indicate full marks. (a) What is Cathode Ray Tube (CRT)? Draw the block diagram of CRT and explain **Q.1** 07 its working. (b) Explain in detail the Kubelka-Munk color mixing laws. 07 Q.2 Write a short note on the photo electric effect. Derive an expression for the 07 (a) photoelectric effect using Einstein's theory. (b) Describe Principal, working and construction of the Bainbridge mass 07 spectrograph. OR (b) I) What is magnetic focusing? Write its application in mass spectrograph. 04 II) An electron shot into a uniform magnetic field at an angle of $60^{\circ}$ moves in a 03 spiral of diameter 10 cm with a period of $6 \times 10^{-5}$ s. Determine the electron velocity and magnetic induction. $e = 1.6 \times 10^{-19}$ C, $m_e = 9.1 \times 10^{-31}$ kg. (I) What is Lorentz force? Write down its mathematical expression. Q.3 02 (a) (II) Describe the Thomson's method to determine e/m of electron. 05 Discuss the de Broglie hypothesis of duality of material particles. Give in detail 07 **(b)** the experiment of Davisson and Germer in support of the hypothesis. OR 0.3 (I) Define work function, threshold frequency and photo sensitive material. 03 (a) (II) If the incident radiation is 0.3 Å, find the wave length of scattered radiation 04 at angle of 45°, Compton shift and the velocity of recoiled electron. $h = 6.625 \times 10^{-34} \text{ J s}, c = 3 \times 10^8 \text{ m/s}, m_e = 9.1 \times 10^{-31} \text{ kg}.$ (I) Light of wave length 200 nm falls on an iron surface with work function 4.5 **(b)** 03 eV. Calculate 1) threshold wavelength 2) stopping potential 3) maximum energy of photoelectrons in electron volt. $h = 6.625 \times 10^{-34}$ J s, $c = 3 \times 10^8$ m/s. (II) State uncertainty principle. Write its mathematical form for the following 04 pair of variables. 1) Position and momentum 2) Energy and Time 3) Angular position and angular momentum. Derive general expression of time independent Schrödinger wave equation in 3 **Q.4** 07 (a) dimensions. Describe all the notations used. (I) State Faraday's law and Lenz's law of electromagnetic induction. 02 **(b)** (II) Explain the physical significance of $\psi$ -function. 03 (III) What do you mean by phase velocity and group velocity? 02 OR Explain with neat diagram the principal and working of cyclotron. Mention the (a) 07 **Q.4** limitations on the energy achieved by a particle in the cyclotron. (I) Define luminosity, gloss, hue and color. **(b)** 04 (II) Define additive and subtractive color mixing. 03

## Date:02/06/2015

Q.5	<b>(a)</b>	(I) What are the basic components of color perception? Define luminosity.	03
		(II) Write a short note on a light source and illuminate with examples.	04
	<b>(b)</b>	Discuss and derive the expression for Beer-Lambert-Bouguer law for dilute	07
		solutions. Mention the important limitations of this law.	
		OR	
Q.5	<b>(a)</b>	(I) Show the different types of electronic transition using a diagram.	04
		(II) What do you mean by color temperature? What does "65" means in D65.	03
	<b>(b)</b>	(I) Write a short note on color rendering index with examples.	03
		(II) What do you mean by spectral power distribution (SPD)? Draw the SPD	04
		curve for incandescent bulb and LED.	

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