

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III • EXAMINATION – WINTER 2013****Subject Code: 133503****Date: 30-11-2013****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.
4. Mass of proton = 1.67×10^{-27} kg Mass electron = 9.1×10^{-31} kg $h = 6.63 \times 10^{-34}$ joule.sec

- Q.1 (a)** (I) What do you mean by phase velocity and group velocity? **02**
 (II) What is the difference between glossy and diffusive reflectance? Draw the necessary diagram. **03**
 (III) Calculate the work function in electron volt for sodium metal, given that photoelectric threshold wavelength is $6000 \text{ \AA}$. **02**
- (b)** What is de Broglie's concept of matter wave? Give an account of Davisson and Germer experiment to show the wave like character of a beam of electron. **07**
- Q.2 (a)** (I) State uncertainty principle. Write its mathematical form for the following pair of variables. **04**
 (i) Position and momentum
 (ii) Energy and Time
 (iii) Angular position and angular momentum
- (II) What is the wavelength of an electron moving with the speed 5.31×10^6 m/sec? Calculate the wavelength of 100 kg rocket moving with velocity 1000 m/s. Which is expected to show the wavelike character and why? **03**
- (b)** What is the Compton effect? Prove that Compton shift is give by **07**
- $$\Delta\lambda = \frac{h}{m_0 c} (1 - \cos \theta)$$
- Where symbol have their visual meaning.
- OR**
- (b)** Explain the principle and working Bainbridge mass spectroscopy **07**
- Q.3 (a)** Discuss the energy level and their discreteness of particle confined in one dimensional box of infinite height. **07**
- (b)** Explain the terms: (i) Color Rendering Index (CRI) **02**
 (ii) Kubleka-Munk function (with the meaning of all symbol) **03**
 (iii) Molar absorptivity **02**
- OR**
- Q.3 (a)** Prove that an electron moves along a parabolic path, when it enters in a uniform electric field applied perpendicular to its motion. Draw only the path trajectory of electron if it enters in a uniform magnetic field at an angle θ ($0^\circ < \theta < 90^\circ$). **07**
- (b)** What is the Cathode Ray Tube (CRT)? Draw the block diagram of CRT and explain its working. **07**
- Q.4 (a)** Define the three color dimension of Munsell color system. Draw only the diagram for Munsell color system. **07**
- (b)** Explain the Beer Lambert Law? Explain the limitation of Beer Lambert law. Draw a graph between %T and concentration. **07**

OR

- Q.4 (a)** What do you mean by additivity of the absorbance? The absorbance of a solution containing two analyte was measured at two different wavelengths corresponding to maxima in absorbance spectrum. The total absorbance was 0.678 at wavelength 1 and 0.890 at wavelength 2. The molar absorptivity for species A are 10 L/mol.cm at wavelength 1 and 12 L/mol.cm at wavelength 2. The cell path length was 1.0 cm. Calculate the concentration of species A and B assuming Beer's behavior. **07**
- (b)** (I) Show the different types of electronic transition using a diagram. **03**
 (II) For each of the following molecule, indicates the possible transition: **04**
 $\text{CH}_3\text{CH}=\text{CH}_2$ $\text{CH}_3\text{CH}=\text{O}$
- Q.5 (a)** (I) Write a note on additive and subtractive color mixing? **07**
 (II) What do you mean by spectral power distribution (SPD)? Draw the SPD curve for incandescent bulb and LED.
- (b)** What is the black body radiation? Write down the characteristics of black body radiation curve. **04**
 What do you mean by color temperature? What does "65" mean in D65? **03**
- OR**
- Q.5 (a)** (I) Write a short note on a light source and an illuminate with examples. **04**
 (II) What do mean by CIE system of Illuminates? Give two example with their CT. **03**
- (b)** (I) An electron is bound by a potential box of infinite height having width of $2.5 \text{ \AA}$. Calculate the lowest possible two permissible energies (in eV) that the electron can have. **04**
 (II) A proton is moving in a circular orbit of radius 14 cm in a uniform 0.35T magnetic field perpendicular to the velocity of the proton. Find the linear speed of the proton. **03**
