

**B.TECH. SEM -II COMPUTER/ INFO. TECH./  
ELECTRONICS / BIO MEDICAL / E & TC) 2014 COURSE  
(CECS) : WINTER - 2017  
SUBJECT: ENGINEERING PHYSICS**

Day: **Thursday**  
Date: **23/11/2017**

Time: **10.00 AM TO 01.00 PM**  
Max. Marks: 60

**W-2017-2009**

**N.B:**

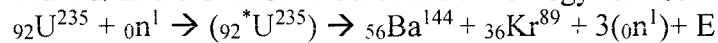
- 1) All Questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Neat diagram must be drawn **WHEREVER** necessary.
- 4) Use of non-programmable **CALCULATOR** allowed.
- 5) Assume suitable data wherever necessary.

**Constants:**

$$e = 1.6 \times 10^{-19} \text{ C}$$
$$m_e = 9.1 \times 10^{-31} \text{ kg}$$
$$h = 6.63 \times 10^{-34} \text{ J-s}$$
$$m_p = 1.66 \times 10^{-27} \text{ kg} = 1.007276 \text{ amu}$$
$$m_n = 1.675 \times 10^{-27} \text{ kg} = 1.008664 \text{ amu}$$
$$\text{Avogadro's Number} = 6.025 \times 10^{23} \text{ atoms/gm-mole}$$

**Q.1 a)** Derive the expression for the motion of electron in parallel electrical field. **(06)**

**b)** What is nuclear fission? Calculate the energy released in MeV **(04)**



Mass of  $\text{U}^{235} = 235.124 \text{ a.m.u}$ , mass of  ${}_0\text{n}^1 = 1.009 \text{ a.m.u}$

Mass of  $\text{Ba}^{144} = 143.922 \text{ a.m.u}$ , mass of  $\text{Kr}^{89} = 88.91 \text{ a.m.u}$

**OR**

**Q.2 a)** Explain the working of Cyclotron. Show that the energy of a particle **(06)**

emerging out of cyclotron is  $E_{\max} = \frac{1}{2} \frac{q^2 B^2 R^2}{m}$ .

**b)** An electron starts at rest at a negative plate under the action of a parallel **(04)**  
electric field with potential difference of 2000 volts. The distance between  
the plates is 2 cm. How long the electron take to reach positive plate. Find  
the velocity at that instant.

**Q.3 a)** What is Hall effect? Obtain the expression for Hall voltage. **(06)**

**b)** What is critical current density? What is the effect of current density, **(04)**  
magnetic field and temperature on superconducting state of the specimen?

**OR**

**Q.4 a)** List the features of Superconductivity? Explain Meissner effect in detail. **(06)**

**b)** A copper specimen having length 1m, width 1cm and thickness 1mm **(04)**  
conduct 2 A current along its length and is applied with a magnetic field of  
2 Tesla along its thickness. A Hall voltage of 0.080  $\mu\text{V}$  appear along its  
length. Calculate the Hall coefficient and mobility of electrons in Copper.  
Given : Conductivity of copper is  $\sigma = 5.8 \times 10^7 (\Omega\text{-m})^{-1}$ .

**(06)**

**Q.5 a)** Derive an expression for ratio (J) of work done to heat produced by Joule's **(04)**  
method.

**b)** Explain the synthesis of colloidal nanoparticle by chemical method. **(04)**

P.T.O.

**OR**

**Q.6 a)** What are the two approaches of nanofabrication? Explain the high energy ball milling method for nanofabrication. **(06)**

**b)** State and explain zeroth and first law of thermodynamics. **(04)**

**Q.7 a)** Explain the phenomenon of interference in thin film of uniform thickness and write the conditions for constructive and destructive interference in reflected region. **(06)**

**b)** Derive the expression for resolving power of grating. **(04)**

**OR**

**Q.8 a)** Discuss the Fraunhofer diffraction at single slit and derive the condition for principal maxima and minima. **(06)**

**b)** Derive the expression for fringe width ( $\beta$ ) in interference in wedge shaped thin film. **(04)**

**Q.9 a)** Discuss the use of Polarimeter for determining the optical rotation of optically active solution. **(06)**

**b)** Explain in brief, the characteristics properties of LASER. **(04)**

**OR**

**Q.10 a)** What is Holography? Explain recording and reconstruction of Hologram. **(06)**

**b)** Explain the terms: - i) Dichroism ii) Retardation plates. **(04)**

**Q.11 a)** Discuss the factors that control reverberation time of a hall. Write Sabine's formula and explain the terms involved in it. **(06)**

**b)** Illustrate the diffraction property of electron demonstrated by Davison - Germer's experiment. **(04)**

**OR**

**Q.12 a)** Derive the expression for Schrodinger's time independent wave equation. **(06)**

**b)** The reverberation time is found to be 2 sec for an empty hall and is found to be 1.5 sec when a curtain cloth of  $20 \text{ m}^2$  is suspended at the center of the hall. If the dimensions of the hall are  $12 \times 10 \times 8 \text{ m}^3$ . Calculate the coefficient of absorption of curtain cloth. **(04)**