

**B.TECH. SEM -II COMPUTER/ INFO. TECH./ ELECTRONICS /  
BIO MEDICAL / E & TC) 2014 COURSE (CBCS) : SUMMER -  
2018**

**SUBJECT: ENGINEERING PHYSICS**

Day: **Friday**  
Date: **08/06/2018**

**S-2018-2217**

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

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:**

$$e = 1.6 \times 10^{-19} \text{ C}$$

$$m_e = 9.1 \times 10^{-31} \text{ kg}$$

$$h = 6.63 \times 10^{-34} \text{ J-s}$$

$$m_p = 1.66 \times 10^{-27} \text{ kg} = 1.007276 \text{ amu}$$

$$m_n = 1.675 \times 10^{-27} \text{ kg} = 9.008664 \text{ amu}$$

$$\text{Avogadro's Number} = 6.025 \times 10^{23} \text{ atoms/gm-mole}$$

**Q.1 a)** Explain the principle, construction and working of Bainbridge mass spectrograph. (06)

**b)** Calculate the power output of nuclear reactor which consumes 15 kg of  ${}_{92}\text{U}^{235}$  per day, Assume that energy released per fission of  ${}_{92}\text{U}^{235}$  is 200MeV. (04)

**OR**

**Q.2 a)** What is reproduction factor (k) for a nuclear fission reactor? What will be the consequences of  $k < 1$ ,  $k = 1$  and  $k > 1$ . Prove that  $k = \eta \times \epsilon \times p \times f$ . (06)

**b)** A beam of electron accelerated by a potential difference of 500 V passed between two co-axial coils which produces a magnetic field perpendicular to the electron beam. Find the radius of curvature of electron beam if the magnetic field strength between the coils is  $50 \times 10^{-4} \text{ wb/m}^2$ . (04)

**Q.3 a)** What is Fermi energy? Show that the Fermi level in intrinsic semiconductor is exactly in the middle of the forbidden gap. (06)

**b)** Explain the terms for superconductor: **i)** Critical field, **ii)** Persistent currents. (04)

**OR**

**Q.4 a)** Distinguish between Type I and Type II superconductors. Explain the effect of change in external magnetic field strength on induced magnetization for Type I and Type II with neat labelled diagrams. (06)

**b)** Derive an expression for conductivity of conductor. (04)

**Q.5 a)** Using p-v diagram explain Carnot cycle. (06)

**b)** Discuss any two properties of nanoparticles that differs from bulk sample. (04)

P.T.O.

OR

- Q.6 a) Explain the growth of nanoparticles by Lamer diagram (06)  
b) State and explain second and third law of thermodynamics. (04)
- Q.7 a) Derive the expression for the interference in wedge shaped thin film. Write the conditions for constructive and destructive interference. (06)  
b) Discuss Rayleigh criteria for resolving power. (04)

OR

- Q.8 a) Derive an expression for resolving power of telescope. Show that it depends upon wavelength ' $\lambda$ ' and the diameter 'd' of aperture. (06)  
b) A wedge shape air film having an angle of 50 seconds of an arc is illuminated by monochromatic light and fringes in reflected system are observed. If the distance between consecutive bright fringes is 0.15 cm then determine the wavelength of light used. (04)
- Q.9 a) What is Nicol's prism? Explain production of plane polarized light using Nicol's prism. (06)  
b) Explain the terms for LASER : - i) Population inversion, ii) Pumping. (04)

OR

- Q.10 a) With energy level diagram, explain the construction and working of He-Ne laser. (06)  
b) Distinguish between positive and negative crystals. (04)
- Q.11 a) Discuss different types of noise. What are the remedies for each type? (06)  
b) If the wavelength of photon is measured such that  $\lambda/\Delta\lambda = 10^6$ . What is the uncertainty  $\Delta x$  in simultaneous measurement of the position of the photon having wavelength of 5000Å. (04)

OR

- Q.12 a) Derive the expression for Schrodinger's time dependent wave equation. (06)  
b) For an empty assembly hall of size  $19 \times 14 \times 9 \text{ m}^3$  the reverberation time is found to be 3 seconds. Calculate total absorption of empty hall. What area of the wall should be covered by the curtain so as to reduce the reverberation time to 2 sec? Given the absorption coefficient of curtain cloth is 0.45. (04)

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