

B.Tech. SEM -I (Chemical/ Civil/ Electrical/ Mechanical/ Production)
2014 Course (CBCS) : WINTER - 2018
SUBJECT: ENGINEERING PHYSICS

Day : Thursday
Date : 29/11/2018

W-2018-2263

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) Use to the non programmable **CALCULATOR** is allowed
- 4) Neat diagram must be drawn **WHEREVER** necessary.
- 5) Assume suitable data if necessary.

$$e = 1.6 \times 10^{-19} \text{ C}$$
$$m_e = 9.1 \times 10^{-31} \text{ kg}$$
$$h = 6.63 \times 10^{-34} \text{ J-s}$$
$$m_p = 1.66 \times 10^{-27} \text{ kg}$$
$$N_a = 6.025 \times 10^{23} \text{ atoms/gm-mole}$$

- Q.1**
- a) What is nuclear fission? Derive the four factor formula. **(06)**
 - b) An electron starts from the rest and moves freely in an electric field $E = 50$ kV/m. Calculate its acceleration. **(04)**

OR

- a) Give the principle, construction and working of an electron microscope. Why the resolving power of electron microscope is higher than optical microscope? **(06)**
 - b) In a thermonuclear reaction 1gm of hydrogen is converted into 0.993gm of helium. Calculate the energy released. **(04)**
- Q.2**
- a) What is superconductivity? Explain it on the basis of BCS theory. **(06)**
 - b) The resistivity of an n-type semiconductor is $5 \times 10^{-6} \Omega\text{cm}$. Calculate the number of donor atoms must be added to obtain the resistivity. **(04)**
Given: $\mu_e = 1500 \text{ cm}^2/\text{V-sec}$

OR

- a) Explain the working of diode on the basis of band theory. **(06)**
 - b) State and explain the terms: **(04)**
 - i) Critical temperature
 - ii) Critical current density
- Q.3**
- a) Explain the physical method of synthesis of nanoparticles. Give its advantages and disadvantages. **(06)**
 - b) State and explain the first law of thermodynamics. **(04)**

OR

- a) What is Carnot engine? Explain the stages of Carnot cycle. **(06)**
- b) State and explain any two applications of nanoparticles. **(04)**

P.T.O.

- Q.4** a) Derive the formula for the minima for diffraction at a single slit. (06)
- b) Diameter of a certain ring changes from 1.3cm to 1.1cm when air film is replaced by liquid film. Calculate the refractive index of the liquid. (04)

OR

- a) In a thin film of uniform thickness, derive the formula the path difference. (06)
- b) A monochromatic light of wavelength $\lambda = 6000\text{\AA}$ is incident normally on the grating. The first order maxima is formed at angle of 20° . Calculate the grating element. (04)

- Q.5** a) State and explain the terms related to the lasers. (06)
- i) Spontaneous emission
ii) Metastable state
iii) Population inversion
- b) Calculate the thickness of a quarter wave plate if $\mu_e = 1.553$, $\mu_o = 1.544$ and $\lambda = 5893\text{\AA}$. (04)

OR

- a) Give the principle, construction and working of Nicols prism. (06)
- b) What are the special properties of laser? How they make lasers different from ordinary light? (04)

- Q.6** a) Explain an experiment in support of De-Broglie's hypothesis. (06)
- b) What are different types of noise? How it can be reduced? (04)

OR

- a) What are the factors affecting the acoustics of a building? Give their remedies. (06)
- b) Calculate the lowest three energy level of an electron trapped in potential well of width 3\AA . (04)

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