

B.TECH. SEM -II (2007 COURSE) (ALL BRANCHES) :
SUMMER - 2018
SUBJECT : ENGINEERING SCIENCES – II

Day : **Monday**
Date : **04/06/2018**

Time : **10.00 AM TO 01.00 PM**
Max. Marks : **80**

S-2018-2553

N. B. ;

- 1) **Q. No. 1 and Q. No. 5 are COMPULSORY.** Out of remaining attempt **ANY TWO** questions from each section.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in the **SEPARATE** answer books.
- 4) Draw neat and labelled diagrams **WHEREVER** necessary.
- 5) Use of non-programmable calculator is **ALLOWED**.
- 6) Assume suitable data, if necessary.

SECTION – I

Constants:

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

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

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

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

$$N_a = 6.025 \times 10^{23} atoms / gm - mole$$

- Q. 1**
- a) What is Fermi level? Show that the Fermi level lies at centre of the energy gap in an intrinsic semiconductor. **(06)**
 - b) Derive Schrodinger's time independent wave equation. **(05)**
 - c) A nuclear reactor needs to supply 4500 MWh of electrical energy per day. The reactor has an efficiency of 30 %. Find the mass of U^{235} needed for a single day operation. **(03)**
- Q. 2**
- a) Explain the motion of an electron in the parallel electric field. **(05)**
 - b) What is nuclear fission? Explain it on the basis of Bohr and Wheeler liquid drop model. **(05)**
 - c) An electron of energy 40 eV is circulating in a plane at right angles to a uniform magnetic field of strength $10^{-4} Wb/m^2$. Calculate the radius of its orbit and its period of revolution. **(03)**
- Q. 3**
- a) Explain Davisson – Germer's experiment on electron diffraction and discuss their results. **(05)**
 - b) Derive energy eigen value of particle trapped in potential well of infinite depth. **(05)**
 - c) Lowest energy of an electron trapped in a potential well is 38 eV. Calculate the width of the well. **(03)**
- Q. 4**
- a) Give the energy band picture of p-n junction diode and explain the effect of biasing on the band picture. **(05)**
 - b) Derive the expression for conductivity in semiconductors. **(05)**
 - c) Explain the energy band structure of diamond and Beryllium. **(03)**

P. T. O.

SECTION – II

- Q. 5** a) Define corrosion. Explain with suitable example dry corrosion theory. (06)
b) Define the term polymer. Give their classification. (04)
c) Explain the term finger print region. (04)
- Q. 6** a) Distinguish between anodic and cathodic protection method for controlling corrosion. (05)
b) Explain galvanic corrosion with the help of Galvanic series. (04)
c) Write a note on cathodic protection. (04)
- Q. 7** a) Describe preparation properties and uses of : (05)
i) Polyvinyl Acetate
ii) Bakelite
b) Explain the function of different ingredients used in compounding of plastics. (04)
c) Give the uses of plastics. (04)
- Q. 8** a) Explain various application of UV –visible spectroscopy. (05)
b) UV-Spectra relatively broad as compare to IR Spectra. Explain. (04)
c) What are the principles of IR spectroscopy? (04)

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