B.Tech. SEM -I (Chemical/ Civil/ Electrical/ Mechanical/ Production)
2014 Course (CBCS) : SUMMER - 2019
SUBJECT : ENGINEERING PHYSICS

Day : Tuesday   Time : 10.00 AM TO 01.00 PM
Date : 14/05/2019   S-2019-2528   Max. Marks : 60

N.B.
1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Use of electronic pocket calculator is allowed.
4) Assume suitable data if necessary.

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

Q.1 a) What are thermonuclear reactions? Explain proton-proton cycle. **(06)**

   b) An electron starts from rest and moves freely in an electric field E = 24 kV/m. **(04)**
       Determine (a) the force on the electron (b) its acceleration.

OR

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

   b) Protons in a cyclotron describe a circle of radius 0.4 m just before emerging **(04)**
       from the dees. If the magnetic field intensity is 1.5 wb/m^2, what is the
       maximum K.E. of the protons?

Q.2 a) Explain working of p-n junction diode on the basis of band theory of solids. **(06)**

   b) Give differences between type – I and type – II superconductors. **(04)**

OR

Q.2 a) State and explain any six applications of superconductors. **(06)**

   b) Calculate the conductivity of pure silicon at room temperature when the **(04)**
       concentration of carriers is 1.6×10^{10}/cm^3. Given : μ_e = 1500 cm^2/V-sec,
       μ_h = 500 cm^2/V-sec,

Q.3 a) What is entropy? Discuss the change in entropy in reversible and irreversible **(06)**
       process.

   b) Discuss the following properties on the nanoparticles i) magnetic **(04)**
       ii) electrical.

OR

Q.3 a) Explain high energy bill milling method productivity nanoparticles. **(06)**

   b) State and explain third low of thermodynamics. **(04)**

P.T.O.

Q.4 **a)** Explain the formation of Newton's rings. Derive the formula for dark ring in **(06)**
reflected system.

b) A slit of width 0.16 mm is illuminated by a light of wavelength 5600A°. Find **(04)**
the half angular width of the central maximum.

OR

Q.4 **a)** State Rayleigh's criterion of resolution. Derive the formula for resolving **(06)**
power of a diffraction grating.

b) MgF_2 of refractive index 1.38 is coated on a glass plate in order to reduce the **(04)**
reflection from the glass surface using ARC. Calculate the thickness of ARC
$(Take, \lambda = 5500A°)$.

Q.5 **a)** Width energy level diagram, explain construction and working of Ruby laser. **(06)**

b) Give differences between positive and negative crystals. **(04)**

OR

Q.5 **a)** What is retardation plate? Derive the formula for thickness of a quarter wave **(06)**
plate.

b) Write a short note on optical pumping. **(04)**

Q.6 **a)** State requirements of acoustically good hall. **(06)**

b) Assume that the uncertainty in the location of a particle is equal to its De **(04)**
Broglie wavelength. Show that the uncertainty in its velocity is equal to its
velocity.

OR

Q.6 **a)** Derive the formula for energy eigen value and eigen function of a particle **(07)**
trapped in a potential well of an infinite depth.

b) Define reverberation and reverberation time. **(03)**

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