P-302

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Seat No.	

First Year Engineering (Semester - I) Examination, April - 2016
ENGINEERIGN PHYSICS
Sub. Code : 59176

Day and Date : Monday, 18 -04 - 2016 **Total Marks : 100**

Time : 10.30 a.m. to 1.30 p.m.

Instructions :
1) **All Questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Given : Charge of electron $e=1.6 \times 10^{-19}$C,**
   Mass of electron $m= 9.1 \times 10^{-31}$kg,
   Avogadro's number $N=6.02 \times 10^{26}$/kg. atom,
   Planck' constant $h=6.63 \times 10^{-34}$J.s

Q1) Attempt any three from the following questions.

a) Explain construction and working of Lorentz half shade polarimeter. **[6]**

b) Derive an expression for resolving power of Grating. **[6]**

c) What is Double Refraction? Explain Huygen's theory of double refraction. **[5]**

d) Define the term grating element and calculate the wavelength of spectral line, when a parallel beam of sodium light is allowed to incident normally on a plane grating having 4250 lines per cm and second order spectral line is observed to be deviated through 30°. **[5]**

Q2) Attempt any three from the following questions:

a) Explain the construction and working of Ruby Laser. **[6]**

b) Explain the principle and construction of optical fiber. **[6]**

c) Write a note on Holography. **[5]**

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d) i) State four characteristics of optical fiber. [2]

ii) Determine the numerical aperture of a Step index fiber, when the core refractive index is 1.52 and cladding refractive index is 1.48. Also find the angle of acceptance. [3]

Q3) Attempt any three from the following questions.

a) Explain the essential parts of nuclear reactor. [6]

b) Calculate the energy released from two kilogram of Uranium (235) in kilo - watt hour. Assume 200MeV energy released from one uranium atom. [5]

c) Explain Proton-Proton cycle of thermonuclear reaction. [5]

d) Explain nuclear Funsion reactor. [5]

Q4) Attempt any three from the following questions:

a) Define atomic radius and find its values for SC, BCC and FCC lattice. [6]

b) Explain construction and working of Bragg's X-ray spectrometer. [6]

c) What are Miller indices? Explain rules for finding Miller indices of a plane and state some important features of Miller indices. [5]

d) Copper has FCC structure and atomic radius is 1.278 A°. Calculate its density. (Given - Molecular weight of copper = 63.54) [5]

Q5) Attempt any three from the following questions.

a) Discuss de Broglie's concept of matter waves. Derive an expression for wave length of matter waves and express it in terms of kinetic energy E of the material particle. [6]

b) i) What is Compton effect? Explain Compton effect on the basis of quantum theory of radiation. [4]

ii) In a compton scattering experiment, X-ray of wavelength 0.015 A° is scattered at 60°. Find the wavelength of scattered X-rays. [2]

c) i) Explain any three properties of matter waves. [3]

ii) Calculate de Broglie wavelength associated with a proton moving with a velocity equal to ($1/20^{th}$) of velocity of light Given - mass of proton = 1.67×10^{-27}kg. [2]

d) State and explain Heisenberg's uncertainty principle. [5]

Q6) Attempt any three from the following questions:

a) With neat diagram explain construction and working of Scanning Tunneling Microscope. [6]

b) What is nano meterial and nano technology? Explain top down and bottom up approach used in synthesis of nano material. [5]

c) Write note on applications of nano materials. [5]

d) What are carbon nanotubes? Discuss their properties. [5]