Seat No.	

S - 1249

Total No. of Pages : 3

First Year Engineering (Revised) (Semester - I) Examination, May - 2015

ENGINEERING PHYSICS (New Course)

Sub. Code : 59176

Day and Date : Monday, 11 - 05 - 2015 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Given : Avogadro's number $N = 6.023 \times 10^{26}$/kg.atom, Planck' constant $h = 6.63 \times 10^{-34}$ J.s**

Q1) Attempt any three from the following questions.

a) Explain the theory of diffraction grating. **[6]**

b) Explain the working of Laurent's Half Shade Polarimeter. **[6]**

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

d) i) Define resolving power of grating. State its formula. **[2]**

ii) Find the minimum number of lines in a plane diffraction grating required to just resolve the Sodium doublet of wavelengths 5890 A° and 5896 A° in the first order and second order. **[3]**

Q2) Attempt any three from the following questions :

a) Explain the construction of Ruby LASER and describe the action of Ruby LASER with the help of energy level diagram. **[6]**

b) Explain the classification of optical fiber. **[6]**

c) State industrial and medical applications of LASER. **[5]**

d) i) Define the terms Angle of acceptance and Numerical Aperture. **[2]**

ii) The numerical aperture of optical fiber is 0.54 and fractional refractive index change is 0.06. Find refractive indices of core and cladding. **[3]**

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Q3) Attempt any three from the following questions.

a) With diagram explain essential parts of nuclear reactor. [6]

b) What is thermonuclear reaction? Explain proton-proton cycle. [5]

c) Write a note on nuclear chain reaction. [5]

d) A nuclear reactor is developing electric power at the rate of 25 MW. Calculate the mass of uranium used in 1000 hours of operation. Assume 200 MeV energy is liberated per uranium atom. [5]

Q4) Attempt any three from the following questions :

a) What is axis of symmetry? Show that thirteen axis of symmetries present in cubic lattice. [6]

b) State and prove Bragg's law of X-ray diffraction. [6]

c) What are Miller indices? Draw the panes (1 1 1), (1 1 0), (1 0 0) and (1 0 1). [5]

d) i) Define the terms atomic radius and packing factor. [2]

ii) Copper has FCC structure. If its density is 8.89 gm/cm^3 and atomic weight is 63.5 gm/mole, calculate atomic radius. [3]

Q5) Attempt any three from the following questions :

a) State de-Broglie Hypothesis and derive an expression for de-Broglie wavelength of electron moving under potential difference of V volt. [6]

b) State and explain Heisenberg's uncertainty principle. [6]

c) State the properties of matter waves. [5]

d) i) What is Compton effect? [2]

ii) Calculate the de Broglie wavelength associated with the automobile of mass 1000 kg moving with a speed of 72 km/hr. [3]

Q6) Attempt any three from the following questions :

a) Explain construction and working of Scanning Tunneling Microscope. [6]

b) Explain Top-Down and Bottom-up approach of synthesis of nanomaterials. [5]

c) What are carbon nano-tubes? Explain its structure. [5]

d) State the applications of nano materials. [5]

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