Seat No.	

S - 1397

SHIVAJI UNIVERSITY, KOLHAPUR

FIRST YEAR ENGINEERING Sem - I (New Course)

Subject : ENGINEERING PHYSICS **Code : 59176**

Day and Date : Wednesday 18 - 12 - 2013 **Time :** 10.00 a.m. to 01.00 p.m.

Total Marks : 100

Note : 1) All Questions are compulsory.

2) Figures to the right indicate full marks

3) Given :- Avogadro's number N = 6.023×10^{26}/kg.atom,
Planck' constant h = 6.63×10^{-34}J.s

Q. 1. Attempt any three from the following questions.

a) Derive an expression for resolving power of grating. 06

b) What is optical activity? Define specific rotation. Calculate the specific rotation if the plane of polarization is turned through 26.4°, when travel through 20 cm length of 20% sugar solution. 06

c) What is Double Refraction? State the difference between positive and negative crystals. 05

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°. 05

Q.2. Attempt any three from the following questions.

a) Explain the principle and construction of optical fiber. 06

b) State four characteristics and any six applications of LASER. 06

c) Write a note on Holography. 05

d) i) State four advantage of optical fiber. 02

ii) Determine the numerical aperture of a Step index fiber, when the core refractive index is 1.5 and cladding refractive index is 1.48. Also find the angle of acceptance. 03

Q. 3. Attempt any three from the following questions.

a) What is nuclear reactor? Explain classification of nuclear reactor. 06

b) Calculate the energy released from one kilogram of Uranium in kilo-watt hour. Assume 200MeV energy released from one uranium atom. 05

c) Explain Carbon - Nitrogen cycle of thermonuclear reaction. 05

d) Explain nuclear Fusion reactor. 05

Q. 4. Attempt any three from the following questions.

a) Find packing factor for S C, B C C and face F C C lattice. 06

b) Explain Bragg's X-ray spectrometer. 06

c) What is plane of symmetry? Draw nine plane of symmetries in cubic crystal. 05

d) What is lattice constant? A substance with FCC lattice has density. 6250 kg/m^3 and molecular weight 60.2. calculate the lattice constant. 05

Q. 5. Attempt any three from the following questions.

a) What are matter waves? Express wavelength of matter waves in terms of kinetic energy and potential difference. 06

b) State and explain Compton effect. Define Compton shift. 06

c) State and explain Heisenberg's uncertainty principle. 05

d) i) state two properties of matter waves. 02

ii) An electron is accelerated through a potential difference of 10 kilo volt. Calculate the de-Broglie wavelength of electron. 03

Q. 6. Attempt any three from the following questions.

a) What is nanomaterial? Explain different techniques used for synthesis of nanomaterials. 05

b) Explain the principle of atomic force Microscope. 05

c) What are carbon nano - tubes? State its properties. 05

d) State the applications of nano materials. 05