Seat
No.

# First Year Engineering (Part - I) (Semester - I/II) Examination, November - 2018
## ENGINEERING PHYSICS (New) (All Branches)
### Sub. Code : 59176

Day and Date : Thursday, 29 - 11 - 2018      **Total Marks : 100**
Time : 02.30 p.m. to 05.30 p.m.

Instructions:
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Given: - Avogadro's number = $6.02 \times 10^{26}$ /kg.atom.
   Planck's constant h = $6.63 \times 10^{-34}$ J.S.
   Electronic charge e = $1.6 \times 10^{-19}$ C
   Electron mass m = $9.1 \times 10^{-31}$ kg

## SECTION - I

**Q1)** Attempt Any Three from the following questions.

a) Discuss the theory of plane transmission grating and obtain grating equation. [6]

b) Explain in detail construction and working of Laurent's half shade polarimeter with a neat diagram. [6]

c) Write a short note on Photo-elasticity. [5]

d) A grating has 6000 lines per centimeter drawn on it. If its width is 10 cm, calculate [5]

    i) resolving power in the second order and

    ii) the smallest wavelength that can be resolved in the third order in 6000 A° wavelength region.

**Q2)** Attempt Any Three from the following questions.

a) Explain the classification of optical fibre. [6]

b) Explain the advantages of optical fibre communication system over conventional method of communication. [6]

c) State and explain the characteristics of laser. [5]

d) i) Define the term acceptance angle and numerical aperture. [2]

    ii) An optical fibre has a numerical aperture of 0.13 and core refractive index is 1.55 in air. Find the numerical aperture in liquid of refractive index 1.29. [3]

*P.T.O.*

*Q3)* Attempt Any Three from the following questions.

a) Define Nuclear Reactor and describe the different basis for classification of the nuclear fission reactor. [6]

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

c) Discuss in brief the conditions for fusion reactor. [5]

d) i) Calculate the fission rate of $U^{235}$ for producing the power of one Watt. Assuming that energy released per fission is 200 MeV. [2]

   ii) Calculate energy in Joule released by fission of 1 gm of $U^{235}$. If energy released per fission of $U^{235}$ is 200 MeV. [3]

## SECTION - II

*Q4)* Attempt Any Three from the following questions.

a) i) What is coordination number? Calculate coordination number for SC, BCC & FCC Lattice. [4]

   ii) Define: Space lattice and unit cell. [2]

b) Write note on symmetry elements of a cubic crystal system. [6]

c) Calculate the glancing angle at (110) plane of a cubic crystal having axial length 0.26 nm corresponding to the second order diffraction maximum for the X-rays of wavelength 0.065nm. [5]

d) Define packing fraction and find its values for BCC and FCC lattice. [5]

*Q5)* Attempt Any Three from the following questions.

a) Explain de Broglie's concept of matter waves and derive an expression for de Broglie wavelength of material particle and express it in terms of kinetic energy of the particle. [6]

b) Explain different properties of matter waves. [6]

c) i) State Heisenberg's uncertainty principle . A microscope using photons is employed to locate an electron in an atom to within a distance of 0.2A°. What is the uncertainty in the momentum measurement of the electron in this way?

[3]

ii) An electron is moving under a potential field of 15kV. Calculate the wavelength of the electron waves.

[2]

d) What is Compton Effect? Explain experimental arrangement used to study Compton Effect.

[5]

**Q6)** Attempt Any Three from the following questions.

a) Explain some important applications of carbon nano tubes.
[6]

b) Explain how optical, electrical, thermodynamic and chemical properties of nano material vary with their size.
[5]

c) With neat diagram explain the construction and working of scanning tunneling microscope.
[5]

d) Write note on production of nano materials.
[5]

⊖⊖⊖