

Seat No.	
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**F.Y. B.Tech. (Semester - I) (New) (CBCS) Examination,
November - 2018
ENGINEERING PHYSICS (All Branches)
Sub. Code : 71811**

Day and Date : Thursday, 29 - 11 - 2018

Total Marks : 70

Time : 02.30 p.m. to 05.00 p.m.

- Instructions :
- 1) Attempt any three questions from each Section.
 - 2) Figures to the right indicate full marks.
 - 3) Given:-

Avogadro's number, $N = 6.023 \times 10^{26}/\text{kg.atom}$ Mass of electron = 9.1×10^{-31} kgCharge of electron = 1.6×10^{-19} CSpeed of light, $c = 3 \times 10^8$ m/sPlank's constant, $h = 6.63 \times 10^{-34}$ J.sSECTION - I**Q1) Answer the following questions.**

- a) What is Double Refraction? State the difference between positive and negative crystals. [6]
- b) A plane diffraction grating has 15000 lines per inch. Find the angle of separation of the 5048 \AA and 5016 \AA lines of Helium in second order. [6]

Q2) Answer the following questions.

- a) Explain construction and working of Ruby laser with neat diagram. [6]
- b) Describe the advantages of fibre optic communication system. [5]

Q3) Answer the following questions.

- a) An amphitheatre has the following important specifications: volume = 500 m^3 ; wall area = 100 m^2 ; floor area = 50 m^2 ; ceiling area = 50 m^2 and the average sound absorption coefficient for (i) wall = 0.01; (ii) ceiling = 0.4; (iii) floor = 0.03. Calculate the average absorption coefficient and the reverberation time. [6]
- b) Define reverberation and absorption coefficient. State and explain Sabine's Formula. [5]

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Q4) Answer any two from the following questions.

- a) Give the theory of plane transmission grating for normal incidence. [6]
- b) The refractive index of core is 1.5 and fractional refractive index change is 0.013. Calculate the refractive index of cladding, numerical aperture and acceptance angle for an optical fibre. [6]
- c) State any three factors affecting the acoustics of auditorium and explain their remedies. [6]

SECTION - II

Q5) Answer the following questions.

- a) What are Miller indices? Explain the rules for finding Miller indices for a particular family of planes and mention some features of Miller indices. [6]
- b)
 - i) Explain the term basis. [3]
 - ii) X rays of wavelength 0.3 \AA are incident on a crystal with a lattice spacing 0.5 \AA . Find the angle at which second order Bragg's diffraction maxima is observed. [3]

Q6) Answer the following questions.

- a) With neat diagram explain construction and working of scanning tunneling Microscope. [6]
- b) Explain properties of nanomaterial. [5]

Q7) Answer the following questions.

- a) What is Compton effect? Explain experimental verification of Compton Effect. Write the formula for Compton shift. [6]
- b) Determine the velocity and kinetic energy of a neutron having de Broglie Wavelength 2 \AA . Given:- Mass of neutron = $1.67 \times 10^{-27} \text{ kg}$. [5]

Q8) Answer any two from the following questions.

- a) Define atomic radius and find its values for SC, BCC and FCC lattice. [6]
- b) Explain top down and bottom up approach for production of nanomaterial. Describe Colloidal method for production of nanomaterial. [6]
- c) i) State and explain any three properties of matter waves.
- ii) State Heisenberg's uncertainty principle. Calculate the smallest possible uncertainty in the momentum of an electron for which the uncertainty in its position is 4×10^{-10} m.

[6]

