

**BTPH 101****B.Tech. / B.Tech. + M.Tech. / B.Tech. + M.B.A.****I / II Semester Examination, May – June, 2018****[All Branches]****Applied Physics**

Choice Based Credit System (CBCS)

**Duration: 3 Hrs.****Maximum Marks : 60****Minimum Pass Marks: 24**

**Note:**

- (1) All questions carry equal marks, out of which part 'A' and 'B' carry 3 marks and part 'C' carries 6 marks.
- (2) From each question, part 'A' and 'B' are compulsory and part 'C' has internal choice
- (3) Draw the neat diagram, wherever necessary
- (4) Assume suitable data, wherever necessary

**Q.1.(A)** What is Group velocity? Discuss Heisenberg's uncertainty principle. **03**

**(B)** Calculate De-Broglie wave length of neutron of energy 30 ev. given  $h = 6.62 \times 10^{-34}$  J-s  
 $m = 1.67 \times 10^{-27}$  kg. **03**

**(C)** Derive an expression for Compton shift and wave length of scattered photon. Explain why Compton shift is not observed with visible light? **06**

**OR**

Determine Eigen Energy value for a free particle in a one dimensional box.

**Q.2.(A)** Nucleus radius is of what order? Discuss Free Electron Model with its success and failure. **03**

**(B)** Explain the V-I characteristics of zener diode and its uses. **03**

**(C)** What is Hall Effect? Deduce expression for Hall coefficient and Hall voltage of a solid. What important informations are obtained from its measurement? **06**

**OR**

Prove that in an Intrinsic semiconductor the Fermi Level lies in the middle of the forbidden gap.

**Q.3.(A)** What is nuclear fission and nuclear fusion, explain in details? **03**

**(B)** Discuss Nuclear Liquid drop with semi empirical mass formula. **03**

*Contd.....*

(C) Describe construction and working of Betatron with neat diagram. Also derive the relation for Betatron condition. 06

**OR**

Explain construction and working of Geiger-Muller counter with quenching techniques.

**Q.4.(A)** Explain Stimulated Emission and population inversion. 03

**(B)** Calculate the numerical aperture and acceptance angle for an optical fibre. Given refractive indices of the core and cladding are 1.45 and 1.40 respectively. 03

**(C)** Explain construction, working and principle of Ruby laser with a diagram. 06

**OR**

Explain construction, working and principle of He-Ne laser with a diagram.

**Q.5.(A)** What do you understand by the resolving power of grating? 03

**(B)** What is the difference between interference and diffraction of light? 03

**(C)** Explain the formation of Newton's ring in reflected light. Prove that in reflected light  $D_n \propto \sqrt{n}$  and ' $D_n \propto \sqrt{2n + 1}$  where  $D_n$  and  $D_{n+1}$  is diameter of dark and bright ring respectively. 06

**OR**

Derive an expression for the intensity distribution due to Fraunhofer diffraction at plane transmission grating.

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