

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**

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- (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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