

**B. Tech. (End Semester) Examination, March -2021**

**Subject:** Physics Theory  
**Branch :** All Branch  
**Max. Marks:** 50

**Paper Code :**PHIR-11  
**Time:** 02:00 Hours

**Instructions**

- I. All questions are compulsory. Marks allotted for each question are shown on the right hand margin.
- II. Students should check the Question paper for any discrepancy, and also ensure that they have been delivered the question paper of right course no. and right subject title.
- III. The two (02) hours time (10.10am to 12.10pm) is given for writing the answers. The last 20 minutes (12.10 to 12.30pm) will be given to submit the single PDF file of the answer sheets through email.
- IV. The students are required to write their roll no. and sign at each page in advance.**
- V. The student should ensure proper internet connectivity with their video working during the examination. The paper may be cancelled in case of late submission.

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- 1 (i) Define translational vector, Miller indices and state Hall effect. [3]  
(ii) The sum of refractive index of cladding and fiber is 2.95 and their difference is 0.03. Calculate numerical aperture of the fiber. [2]  
(iii) Sun radiates  $3.8 \times 10^{26}$  joule energy per second. If sun radius is  $7 \times 10^8$  m, then calculate magnitude of Poynting vector of sun surface. [3]  
(iv) What is reactor criticality? [2]
- 2 (i) Explain negative effective mass. How effective mass is different from the free electron mass? [5]  
(ii) Discuss the Body centred cubic structure with suitable diagram and estimate value of effective number of atom per unit cell, Coordination number and atomic packing factor. [5]
- 3 (i) Derive the mass-energy equivalence relation and give two examples of mass-energy equivalence. [7]  
(ii) Explain the statement 'moving clock appears to go slow to a stationary observer'. [3]
- 4 Derive time independent Schrodinger equation. Describe the significance of Schrodinger equation. [10]
- 5 (i) Derive the Einstein's coefficients and discuss the significance of these coefficients for lasers. [7]  
(ii) Calculate the degree of non-monochromaticity for 500 nm wavelength, if coherence time is  $10^{-10}$  sec. [3]