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End Term, Odd Semester, 2018-19

B. Tech., I-Year, I-Semester

BPHS 0001 : Engineering Physics

Time: 3 Hours Max Marks: 50

## Section A

**Note: Attempt all questions.** **(7x5=35)**

I. Define the coherent sources of light and derive the expression of intensity distribution in case of Young's double slit experiment. Also plot this graph.

II. In Young's two slit experiment the intensity ratio of the two slits are 1:4. What is the intensity ratio of minima and maxima in the interference pattern?

III. What is a plane transmission grating? Explain. Deduce the expression for resultant intensity in a diffraction pattern formed due to transmission grating.

**OR**

Explain superconductivity. Differentiate between Type I and Type II superconductors. Give some examples of typeI and typeII superconductors.

IV. Explain Hall effect and obtain the expression for Hall coefficient. Discuss one application of Hall Effect experiment.

V. Write down the Maxwell's equations in free space and show that the electromagnetic waves travel with the speed of light in free space.

VI. Deduce Einstein's Mass- Energy relation and discuss it.
Calculate the relativistic energy of a proton moving with speed of 0.6c.

VII. What is Compton effect? Derive the expression for the change in wave length of a photon when it is scattered by a free electron. Also calculate the value of Compton wave length of an electron.

**OR**

Explain Heisenberg's uncertainty principle. Using this principle, show that an electron can not reside in the nucleus.

## Section B

**(I) Attempt all questions. Marks are shown against them.**

(a) Two particles approach to each other with a speed of 0.6c with respect to the laboratory fame. What is their relative speed? (2)

(b) Find the expression of time dilation. (2)

(c) What is the de-Broglie wave length of an electron moving through a potential difference of 1keV. (2)

**(II) Attempt all questions. Marks are shown against them.**

(a) Describe the Bragg's law of diffraction. (3)

(b) Show that the group velocity is equal to the velocity of the particle. (3)

(c) Find the energy of a particle confined in a box of length L and height of infinite potential. (3)



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