**M. TECH. (NANO TECHNOLOGY) SEM-I (CBCS – 2015 COURSE) : SUMMER - 2018**

**SUBJECT: NANO PHYSICS**

Day: **Wednesday** | **S-2018-2941** | Time: **11.00 AM TO 02.00 PM**
Date: **30/05/2018** | Max Marks: 60

**N.B.:**

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Answer to both the sections should be written in **SEPARATE** answer book.

## SECTION-I

**Q1** Explain jj coupling scheme for two valence electron system using vector diagram. **(10)**

**OR**

What are various quantum numbers in vector atom model? Give physical significance of each. **(10)**

**Q2** What are matter waves? Obtain an expression for their wavelength. **(10)**

**OR**

A particle is enclosed in a 1D rigid box. Using the Schroedinger's steady state equation obtain the eigen values of energy of the particle. **(10)**

**Q3** What are Miller indices? Draw the planes for (100), (110) and (111). **(10)**

**OR**

Write a short note on point defects. **(10)**

## SECTION-II

**Q4** What is Op-Amp? Give the features of an ideal Op-Amp. **(10)**

**OR**

With neat circuit diagram, explain the working of Wienbridge oscillator. **(10)**

**Q5** With energy level diagram, explain the working He-Ne gas laser. **(10)**

**OR**

What is population inversion? Why three level laser system is preferred over two level laser system? **(10)**

**Q6** Using Gauss's law, find the electric field inside and outside a sphere. **(10)**

**OR**

Starting with Maxwell's equation, derive the formula for electromagnetic wave. **(10)**

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