**Ph.D. COMMON ENTRANCE TEST**

**SUBJECT–PHYSICS & ELECTRONICS**

**Roll No:**

**PART B**

**Duration: 60 minutes Maximum Marks: 50**

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| **Instructions:**   1. **This entrance test question paper is not to be taken out of the examination hall** 2. **Question paper consists of Section A and Section B** 3. **Section A consists of 30 MCQs carrying 1 Mark each. Write the Alphabet of the correct answer in the space given.** 4. **Section B consists of Descriptive questions carrying 5 marks each. Restrict your answer to 500 words. Additional plain sheets have been attached to the question paper to answer Section B** |

**SECTION – A**

**Answer the following questions by writing the Alphabet of the correct answer in the Box given:30 X 1 = 30**

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|  | The variation of resistance with temperature in a metal and a semiconductor arises essentially due to the difference in  A. Crystal structure  B. Scattering mechanism with temperature  C. No. of charge carriers with temperature  D. None of the above |
|  | Intensity of a wave is directly proportional to the  A. Amplitude  B. Square of amplitude  C. Cube of amplitude  D. None of the above |
|  | In Ruby laser, population inversion is achieved by applying  A. electric field  B. magnetic field  C. optical pumping  D. None of the above |
|  | Parity is not conserved in  A. Gamma decay  B. Beta decay  C. Muon decay  D. None of the above |
|  | If determinant A = 0, then A is a  A. Zero matrix  B. Singular matrix  C. Non-singular matrix  D. None of the above |
|  | An uncharged object has  A. More protons  B. More electrons  C. Equal electrons and protons  D. None of the above |
|  | At absolute zero temperature, an intrinsic semiconductor has  A. many holes  B. many free electrons  C. no holes or free electrons  D. None of the above |
|  | Rotation of plane of oscillation of Foucault's pendulum in the Southern hemisphere is  A. clockwise  B. anti-clockwise  C. both of the above  D. no rotation |
|  | Rotation of plane of oscillation of Foucault's pendulum in the Southern hemisphere is from  A. East to West  B. West to East  C. North to South  D. South to North |
|  | Trace of each of the Dirac matrices is  A. 1  B. -1  C. 0  D. None of the above |
|  | Diamond lattice consists of two interpenetrating  A. BCC lattice  B. FCC lattice  C. Simple lattice  D. Highly dense lattice |
|  | In rotating crystal method  A. Crystal rotates  B. X-rays are monochromatic  C. Fixed Photographic plate  D. All the above |
|  | The number of crystal systems  A. 5  B. 7  C. 10  D. 17 |
|  | The two dimensional lattice are called  A. Linear lattice  B. Plane lattice  C. Space lattice  D. Amorphous materials |
|  | Number of three dimensional space groups are  A. 5  B. 7  C. 10  D.230 |
|  | Gamma function Γ(n) =  A. (n-1)!  B. n (n-1)!  C. n (n+1)!  D. None of the above |
|  | Phenomena in which a charged body attract uncharged body is called  A. Electrostatic induction  B. Electric current  C. Charge movement  D. None of the above |
|  | The potential of the electron in an hydrogen atom is  A. quadratic  B. spherically symmetric  C. polar  D. None of the above |
|  | If A is a symmetric matrix, then AT =  A. A  B. |A|  C. 0  D. None of the above |
|  | Non-inertial frames  A. are accelerated frames  B. are unaccelerated frames  C. cannot be rotating frames  D. None of the above |
|  | A particle is at rest in a rotating frame. The pseudo force acting one the particle in the rotating frame is  A. zero  B. only the centrifugal force  C. only the Coriolis force  D. None of the above |
|  | Raman scattering is a/ an  A. inelastic scattering  B. elastic scattering  C. Rutherford scattering  D. None of the above |
|  | The unit of electromagnetic induction is  A. Gauss or Tesla  B. Farad  C. Coulomb  D. None of the above |
|  | Maxwell – Boltzmann velocity distribution does not assume following:  A. Particles are distinguishable  B. Particles are indistinguishable  C. Inter molecular interaction is weak  D. None of the above |
|  | Frequency modulation has  A. larger band width and lower signal to noise ratio  B. smaller band width and lower signal to noise ratio  C. larger band width and higher signal to noise ratio  D. None of the above |
|  | In rotational symmetry which one is absent for crystal system  A. 2-fold  B. 3-fold  C. 5-fold  D. None of the above |
|  | Thermal conductivity of materials with cross sectional area (A) and length (l) is directionally proportional to  A. A and (1/l)  B. (1/A) and l  C. A and l  D. None of the above |
|  | The value of the commutator [ x, px] is  A. 0  B. ħ/2  C. iħ  D. None of the above |
|  | Fermi level in metal is defined as the  A. Highest level energy occupied by electron at 0K  B. Highest level energy occupied by electron at room temperature  C. Lies between conduction and valence band  D. None of the above |
|  | The value of 0! is  A. 0  B. 1  C. -1  D. None of the above |

**Section - B**

**Answer any four questions (Each question carry 5 marks 4\*5 = 20**

1. Distinguish between Bosons and Fermions. Give examples.

2. Explain the classification of solids based on band theory.

3. Write a note of Bravais lattices.

4. Mention the advantages of IC over discrete component circuits.

5. Write a note on the 'Standard model of elementary particles'.

6. Explain 'wave-particle duality'.