**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**
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**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 inA. Crystal structureB. Scattering mechanism with temperatureC. No. of charge carriers with temperatureD. None of the above |
|  | Intensity of a wave is directly proportional to theA. Amplitude B. Square of amplitudeC. Cube of amplitudeD. None of the above |
|  | In Ruby laser, population inversion is achieved by applyingA. electric field B. magnetic fieldC. optical pumpingD. None of the above |
|  | Parity is not conserved in A. Gamma decayB. Beta decayC. Muon decayD. None of the above |
|  | If determinant A = 0, then A is aA. Zero matrix B. Singular matrixC. Non-singular matrixD. None of the above |
|  | An uncharged object hasA. More protons B. More electronsC. Equal electrons and protonsD. None of the above |
|  | At absolute zero temperature, an intrinsic semiconductor has A. many holesB. many free electronsC. no holes or free electronsD. None of the above |
|  | Rotation of plane of oscillation of Foucault's pendulum in the Southern hemisphere isA. clockwiseB. anti-clockwise C. both of the aboveD. no rotation |
|  | Rotation of plane of oscillation of Foucault's pendulum in the Southern hemisphere is fromA. East to WestB. West to EastC. North to SouthD. South to North |
|  | Trace of each of the Dirac matrices isA. 1B. -1C. 0D. None of the above |
|  | Diamond lattice consists of two interpenetratingA. BCC latticeB. FCC latticeC. Simple latticeD. Highly dense lattice |
|  | In rotating crystal methodA. Crystal rotatesB. X-rays are monochromaticC. Fixed Photographic plateD. All the above |
|  | The number of crystal systemsA. 5B. 7C. 10D. 17 |
|  | The two dimensional lattice are calledA. Linear latticeB. Plane latticeC. Space latticeD. Amorphous materials |
|  | Number of three dimensional space groups areA. 5B. 7C. 10D.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 calledA. Electrostatic induction B. Electric currentC. Charge movementD. None of the above |
|  | The potential of the electron in an hydrogen atom isA. quadraticB. spherically symmetricC. polarD. 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 framesA. are accelerated frames B. are unaccelerated frames C. cannot be rotating framesD. 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 forceD. None of the above |
|  | Raman scattering is a/ an A. inelastic scattering B. elastic scattering C. Rutherford scatteringD. None of the above |
|  | The unit of electromagnetic induction isA. Gauss or Tesla B. Farad C. CoulombD. None of the above |
|  | Maxwell – Boltzmann velocity distribution does not assume following:A. Particles are distinguishableB. Particles are indistinguishableC. Inter molecular interaction is weakD. None of the above |
|  | Frequency modulation hasA. larger band width and lower signal to noise ratioB. smaller band width and lower signal to noise ratioC. larger band width and higher signal to noise ratioD. None of the above |
|  | In rotational symmetry which one is absent for crystal systemA. 2-foldB. 3-foldC. 5-foldD. 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] isA. 0B. ħ/2C. iħD. None of the above |
|  | Fermi level in metal is defined as theA. Highest level energy occupied by electron at 0KB. Highest level energy occupied by electron at room temperatureC. Lies between conduction and valence bandD. None of the above |
|  | The value of 0! isA. 0B. 1C. -1D. 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'.