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**TOPICS FOR INTERNAL ASSESSMENT ASSIGNMENTS (2018-19)**  
**Programme: M.Sc. PHYSICS (Previous)**

*Note: Students are advised to read the separate enclosed instructions before beginning the writing of assignments.*

*Out of 15 Internal Assignment marks per paper, 5 marks will be awarded for regularity (attendance) to Counseling/ Contact Programme/ Practical classes pertaining to the paper. Therefore, the topics given below are only for 10 marks each paper.*

**Paper I: MATHEMATICAL METHODS AND CLASSICAL MECHANICS**

1. Prove that addition and subtraction of two tensor of same order is also a tensor of same order. State the quotient law for tensors. Illustrate the same with an example. **5Marks**
2. Two equal masses  $m$  connected by mass less rigid rod of length 'l' forming a dumb-bell is rotated in x-y plane. Find the lagrangian and obtain lagrange's equations of motion. **5Marks**

**Paper II: QUANTUM AND STATISTICAL MECHANICS**

1. State the axioms of a linear vector space over a complex field. Discuss the additional axioms to be satisfied in the case of Hilbert space. **5Marks**
2. Deduce the condition for statistical equilibrium of two systems in thermal contact with each other. **5Marks**

**Paper III. SOLID STATE PHYSICS**

1. Describe the Rotating- Crystal method of X-ray diffraction and calculate the interplanar spacing for (212) plane in a simple cubic lattice where lattice constant  $a=4.6\text{\AA}$  **5Marks**
2. State the Bloch theorem and Obtain the velocity of Bloch electron and its effective mass. Also draw the plots of  $V$  versus  $K$  and  $m^*$  versus  $K$  **5Marks**

**Paper IV. ELECTRONICS**

1. Explain how can a scale changer and phase shifter be obtained with an op-Amp and show that an op-Amp performs the algebraic operations of addition and subtraction **5Marks**
2. Convert the following decimal numbers in to equivalent octal numbers (1) 237 (2) 6327.45 (3) 0.75 (4) 334.05 **5Marks**

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