



# KUVEMPU UNIVERSITY

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## TOPICS FOR INTERNAL ASSESSMENT ASSIGNMENTS (2016-17) 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. Derive Hamilton's equations of motion. Establish that if the Lagrangian does not involve time explicitly then Hamiltonian is the total energy of the system and is a constant 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 **5Marks**  
(1) 237 (2) 6327.45 (3) 0.75 (4) 334.05