Reg. No.									

MANIPAL UNIVERSITY, MANIPAL
III SEMESTER M.Sc. PHYSICS

SUBJECT: CONDENSED MATTER PHYSICS I - PHY 707.1
NOVEMBER 2017 (REVISED CREDIT SYSTEM)

Time 3 Hrs.] **[Max. Marks: 50**

Note: ☞ **Answer ANY FIVE FULL questions in a continuous sequence.**

1A. Using Knudsen cosine law, derive an expression for the thickness of the deposit for a surface Source. [5]

1B. What are the factors that influence the operation of glow discharge. Explain in detail. [5]

2A. Explain the Fizeau method of thickness measurement. [5]

2B. A quartz crystal with a resonant frequency of 6 MHz is used to monitor the thickness of silver coating. If a frequency shift of 0.80 kHz is observed for a particular thickness of the film, calculate the thickness of the coated layer. Density of silver is 10.5 g/cc. Constant of the crystal is $8MHz.m^2/Kg$ [2]

2C. Explain the following processes in a chemical vapour deposition (a) Pyrolysis and (b) Halide Disproportionation. [3]

3A. Derive an expression for heterogeneous nucleation rate equation using capillarity model. [8]

3B. Explain the term epitaxy and classify them. [2]

4A. Explain the Naughbauer webb model of quantum mechanical tunneling in discontinuous thin films and derive an expression for electrical conductivity. [6]

4B. Write the significance of size effect in thin films. [2]

4C. Calculate the island separation that need to be fixed so that it can be used as a commercial strain gauge sensor, with a strain sensitivity of 2. Assume that the barrier height is 0.5 eV and the relative mass is 0.9 [2]

5. Define Airy's function. Derive an expression for the transmittance and reflectance of a single, homogeneous and non absorbing thin film in air, assuming multiple beam reflection interference principle. [10]

6A. What is photolithography? Explain various processes involved in photolithography. [4]

6B. Explain (a) Mechanical griding (b) Inert gas condensation technique of preparing nanomaterials. [6]