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Dr. DK

Prepared by

MANIPAL UNIVERSITY, MANIPAL
III SEMESTER M.Sc. PHYSICS

SUBJECT: CONDENSED MATTER PHYSICS I - PHY 707.1
(MAKE UP EXAMINATION – DECEMBER 2016)
(REVISED CREDIT SYSTEM)

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

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

1A. Explain the following deposition techniques (a) resistive heating (b) Flash evaporation [5]

1B. What is glow discharge sputtering? Explain the operation of a glow discharge sputtering [5]

2A. Explain the interference method of finding the thickness of the thin films. [5]

2B. A quartz crystal with a resonant frequency of 6 MHz is used to monitor the thickness of aluminum 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 Al is 2.7 g/cc. Constant of the crystal is 8MHz.m^2/Kg [2]

2C. Explain the Langmuir-Blodgett (LB) films. [3]

3A. Explain capillarity theory of heterogeneous nucleation and show that $\Delta G^* = \frac{16\pi\gamma^3}{3\Delta G_v^2}\left\{\frac{2-3\cos\theta+\cos^3\theta}{4}\right\}$ [6]

3B. What are the general steps involved in nucleation and growth of thin films. [4]

4A. What are discontinuous thin films? Explain electron transfer between the discontinuous metal islands by tunneling and derive an expression for electrical conductivity. [6]

4B. Explain conduction mechanism in thin insulating films. [4]

5. Assuming a single, homogeneous and non absorbing thin film, derive an expression for the transmittance and reflectance of the thin film in air. [10]

6A. What are nanomaterials? Classify them as per the dimensions. Give few examples. [4]

6B. Explain any one bottom up and top down approach for creating the nanomaterials [6]

Set by DK