Reg. No. | | | | | | | | | | |

Dr. DK

MANIPAL UNIVERSITY, MANIPAL
III SEMESTER M.Sc. PHYSICS

Prepared by

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

Time 3 Hrs.] **(01-12-2016)** **[Max. Marks: 50**

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

1A. Assuming a point source, derive an expression for the thickness of the deposit along a planar substrate. [5]

1B. Discuss the following deposition techniques (a) rf sputtering (b) anodic oxidation [5]

2A. Explain the quartz crystal monitoring technique and discuss the sensitivity of the oscillator. [6]

2B. Fringes of equal thickness are formed in a Fizeau technique with the fringes separated at a distance of 0.150 mm. The fringes at the step gets shifted by an amount 0.025 mm. If a monochromatic source of wavelength 589.3 nm is used , calculate the thickness of the deposited layer. [2]

2C. Calculate the contact angle for the following condition: Substrate to vapor interfacial energy is equal to the difference between film-substrate and vapor-film interfacial energy. [2]

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

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

4A. Discuss the influence of surface scattering on the conductivity of continuous thin films and derive an expression for the electrical conductivity. [5]

4B. Derive an expression for temperature coefficient of resistivity and strain sensitivity of a discontinuous metal thin films. [5]

5. Using the method of summation, derive an expression for the irradiance of reflected and transmitted light from a single layer homogenous non absorbing thin film in air. [10]

6A. What is photolithography? Explain various steps involved in obtaining the nanostructures using positive and negative photoresists. [4]

6B. Explain inert gas condensation process for creating nano materials. [4]

6C. Mention few applications of nano materials. [2]

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