Examination Roll No.....

YMCA UNIVERSITY OF SCIENCE& TECHNOLOGY, FARIDABAD

MSc. Physics –II semester

Condensed Matter Physics (PHY 203) Reappear, MAY 2018

Time: 3 Hours Max. Marks:60

Note: *It is compulsory to answer the questions of Part -1. Limit your answers within 20-40 word in this part.*

Answer any four questions from Part -2 in detail.

Different parts of the same question are to be attempted adjacent to each other.

PART -1

Q1	(a)	Explain the concept of effective mass.	(2)
	(b)	How can you determine the structure of a crystal?	(2)
	(c)	What is symmetry? Explain three types of symmetry.	(2)
	(d)	Give the definition of Fermi surface.	(2)
	(e)	If V is the volume of the primitive cell of the direct lattice, show that the volume of the primitive cell of the reciprocal lattice is $8\pi^3/V$.	(2)
	(f)	Define Plasmon and polaron.	(2)
	(g)	Draw the E-K diagram of free particle in reduced zone scheme.	(2)
	(h)	Define bragg's law in reciprocal lattice.	(2)
	(i)	Define atomic form factor.	(2)
	(j)	What is Quantum Hall Effect?	(2)

PART -2

Q2	(a)	By the Kronig-Penny model, the relation between k, total energy E and potential barrier V_0 can be obtained as follows $P_0 \sin \alpha a/\alpha a + \cos \alpha a = \cos ka$ where $P_0 = 4\pi^2 mV0ba/h^2$ How E will be expressed, (i) if the potential barrier is negligibly low, i.e., $V_0 = 0$, (ii) if the potential barrier is infinitively high, i.e., $V_0 \rightarrow \infty$, while the width b keep some finite value (so $V_0 b \rightarrow \infty$). For both cases, plot the E as a function of k.	(5)
	(b)	Calculate the packing fractions for the following three-dimensional lattices: simple cubic and body-centered cubic.	(5)