Reg. No.: .....

Name: .....

University of Kerala

W7061

Third Semester FYUGP Degree Examination, November 2025

Discipline Specific Core Course

PHYSICS

UK3DSCPHY202 - Solid State Physics and Spectroscopy

Academic Level: 200-299

2024 Admission

Time: 1 Hour 30 Minutes(90 Mins.) **Max. Marks: 42**

Part A. 6 Marks.Time:6 Minutes.(Cognitive Level:Remember(RE)/Understand(UN)) Objective Type. 1 Mark Each.Answer all questions

Qn No.	Question	CL	CO
1	Define primitive cell	RE	1
2	Identify the radiation in electromagnetic spectrum which is used for medical imaging	RE	2
3	Explain the classification of solids based on band theory	UN	1
4	Describe various regions in electromagnetic spectra	UN	2
5	Summarize the importance of Moseley's law	UN	2
6	Explain the concept of a primitive unit cell and how it differs from a non-primitive unit cell in a crystal lattice	UN	1

Part B.8 Marks.Time:24 Minutes.(Cognitive Level:Understand(UN)/Apply(AP))Short Answer. 2 marks each.Answer all questions

Qn No.	Question	CL	CO
7	Explain the salient features of vector atom model	UN	2
8	Explain the terms lattice and basis	UN	1
9	**Calculate the radius of Bohr’s orbit in the ground state of the hydrogen atom.**	AP	2
10	Illustrate the difference between intrinsic and extrinsic semiconductors	AP	1

Part C. 28 Marks.Time:60 Minutes (Cognitive Level:Apply(AP)/Analyse(AN)/Evaluate(EV)/Create(CR)) Long Answer.7 marks each.Answer all 4 Questions choosing among options * within each question

Qn No.	Question	CL	CO
11	A) Demonstrate the different elements of symmetry in a crystal OR B) Illustrate with examples the seven crystal systems pointing out their characteristics features.	AP	1, 1
12	A) (a) Investigate the band diagrams for conductors, semiconductors and insulators. (b) Analyse the position of impurity levels in P and N type semiconductors. OR B) Examine the effect of doping on an intrinsic semiconductor. Investigate how N type and P type semiconductors differ in terms of charge carriers and band structure?	AN	1, 1
13	A) Evaluate the origin of pure rotational spectrum in a diatomic molecule. OR B) Evaluate an expression for the energy of an electron in the n^{th} orbit of hydrogen atom.	EV	2, 2
14	A) Develop the simple harmonic oscillator model of a diatomic molecule and show that all vibrational transitions give rise to the same frequency. OR B) Develop a diagram illustrating all the spectral series of hydrogen with transition paths.	CR	2, 2