

Periodical Test (June 07, 2021)
Physics – BS 102
B.E. (Chemical) – 2nd Semester
(Chemical with MBA / Food technology)

Max. Time: 1 hr

Max. Marks: 25

Instructions: Attempt all questions.

1. .. 2x5=1
- a. Find the polarizing angle for a glass of refractive index 1.732.
 - b. Briefly describe the Meissner effect.
 - c. Define Curie temperature in magnetic property of materials.
 - d. Give one example each of zero-, one- and two-dimensional nanomaterials?
 - e. From an electronic perspective note and briefly explain the two sources for magnetic moments in materials.
2. The metal rubidium has a BCC crystal structure. If the angle of diffraction for the (321) set of planes occurs at 27.00° (first-order reflection) when monochromatic x-radiation having a wavelength of 0.0711 nm is used, compute (a) the interplanar spacing for this set of planes, and (b) the atomic radius for the rubidium atom. (3)
3. Define the following: (a) electric dipole, (b) dielectric material, and (c) polarization. (3)
4. Show that the atomic packing factor for BCC is 0.68. (3)
5. A plane transmission grating of width 2 inch is ruled with 15000 lines per inch. Find the smallest wavelength difference that can be resolved in second order at a mean wavelength of 5000 \AA . (3)
6. Figure below shows an X-ray diffraction pattern for α -iron taken using a diffractometer and monochromatic x-radiation having a wavelength of 0.1024 nm; each diffraction peak on the pattern has been indexed. Compute the interplanar spacing for each set of planes indexed; also determine the lattice parameter of Fe for each of the peaks. (Peak index and 2θ values are given)

