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Total No. of Pages : 02

Total No. of Questions : 09

B.Sc. (Non-Medical) (Sem.-6)

PHYSICAL CHEMISTRY-IV

Subject Code : BSNM-602-18

M.Code : 79494

Date of Examination : 04-07-22

Time : 3 Hrs.

Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :
 - a) Determine whether the following operator is linear or nonlinear :
$$\hat{A}f(x) = \text{SQRT } f(x), \text{ (where, SQRT = square root)}$$
 - b) Test whether d/dx is Hermitian operator or not.
 - c) How many microstates are possible for p^3 configuration?
 - d) Write the conditions for two wave functions, $\Psi_i(x)$ and $\Psi_j(x)$ to be orthonormal.
 - e) Calculate the number of degenerate states for hydrogen atom for $n = 4$.
 - f) What is the number of atoms in a unit cell of a face-centred cubic crystal?
 - g) Write down the mathematical expression of Bragg's law.
 - h) Define unit cell.
 - i) State Stark-Einstein law.
 - j) Mention any example of non-radiative process.

SECTION-B

2. Briefly explain about photoelectric effect.
3. State de Broglie hypothesis and Heisenberg uncertainty principle.
4. Energy of a particle in a cube with dimension L is given by $14h^2/8L^2m$. Calculate the degeneracy.
5. State and explain Grotthus-Draper law and mention limitations.
6. Calculate Miller indices of plane cut through the crystal axes at $(-2a, 4b, -8c)$.

SECTION-C

7. a) Calculate the probability of finding a particle in 1-D box of length L in region between $L/4$ and $3L/4$ for quantum number $(n) = 1$.
b) Write a short note on heat capacity of solids.
8. Write a short note on:
 - a) Quantum yield
 - b) Jablonsky diagram.
9. Briefly explain unit cell and space lattice.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.