Roll No. | | | | | | | | | | | | | **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 : 04-01-23

Time : 3 Hrs. **Max. Marks : 50**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying ONE mark 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) Check the acceptability of the following function: $\mathrm{Sin}^{-1} x$ (+1 to –1)

b) Calculate the number of radial node and angular node of 2d orbital

c) Determine whether the following functions are normizable or not over the indicated intervals: ex $(0, \infty)$

d) Calculate the number of radial node and angular node of 3p orbital.

e) What is the condition to be followed for orthonormality of two wave functions?

f) State Grotthus-Draper law.

g) Mention an example of photochemical reaction.

h) Define quantum yield.

i) Write down mathematical expression of Bragg's law with meaning of the parameters involved.

j) What is the crystal structure of NaCl?

SECTION-B

2. Calculate the expectation value of x-component of momentum of a free particle in a box of length 1, $\Psi = \sqrt{\frac{2}{l}} \sin\left(\frac{n\pi x}{l}\right)$

3. Show that e^{ax} is an eigen function of the operator d^n/dx^n. What is the eigen value?

4. Draw and explain Jablonski Diagram.

5. Briefly explain the difference between thermal rection and photochemical reaction.

6. Calculate Miller indices of plane cut through the crystal axes at $(-4a, 3b, -6c)$.

SECTION-C

7. Determine the value of A_m so that the wave function $\psi_m(\phi) = A_m e^{im\phi}$, where,

   $m = 0, \pm1, \pm2$ $(0 \leq \phi \leq 2\pi)$ are normalised.

   Find the degeneracies of the first four energy levels of a particle in a three dimensional for which $L_1 = L_2 = 1.5L_3$.

8. Write a short note on (a) photosensitized reaction and (b) Stark-Einstein law.

9. Briefly explain space lattice and law of crystallography.

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.