QP Code: RF23MSC023 | Reg. No | | | | | | | | | | | AY 23

GIET UNIVERSITY, GUNUPUR – 765022

M. Sc. (First Semester) Regular Examinations, February – 2024

22CHPC103 - Physical Chemistry-I

(Chemistry)

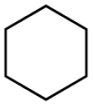
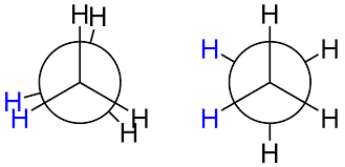
Time: 3 hrs | Maximum: 70 Marks

(The figures in the right hand margin indicate marks.)

PART – A **(2 x 10 =20 Marks)**

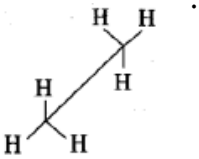
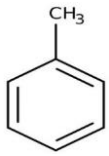
Q.1. Answer ALL Questions		CO#	Blooms Level
a.	Identify the Mulliken notation for the following irreducible representation:	CO1	K4

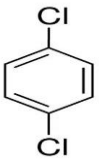
E	C_n	nC_2	i	σh
1	1	-1	-1	-1

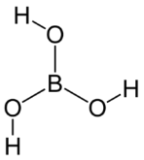
b.	How many meta stable curves are there in the phase diagram of sulphur?	CO2	K2
c.	Calculate the zero point energy of a electron of path length 10 nm.	CO3	K2
d.	Define Recursion of a function.	CO4	K2
e.	The symmetry point group of the given structure: 	CO1	K4
f.	Explain Meta stable curve with suitable example.	CO2	K2
g.	What is the degeneracy of SHO given that E_{3D} =23/2 hU.	CO3	K2
h.	Describe the process of program writing.	CO4	K2
i.	Find the symmetry elements and point group of the given molecules: 	CO1	K4
j.	Calculate the Electron density and bond order of butadiene system.	CO3	K2

PART – B **(10 x 5 = 50 Marks)**

Answer ***ANY FIVE*** the questions		Marks	CO#	Blooms Level
2. a.	Find out the matrix representation of different symmetry elements (E, i, σ-matrix)	5	CO1	K4
b.	Prepare the GMT for C_4 , C_{2h} , C_{2v}	5	CO1	K4
3.	State the phase rule with different case studies.	10	CO2	K4
4.	Derive Schrödinger wave function for hydrogen atom. Conversion of Cartesian co-ordinate into spherical co-ordinate.	10	CO3	K4
5.	Programme for Computer Vander Waal's constants 'a' and 'b' for a gas by $a = \frac{PV^2}{n^2}$, $b = \frac{V}{n}$	10	CO4	K4
6.	Define Point group and its types. Find the point group for the following Species:	10	CO1	K4





7.a	Prove that momentum operator is a Hermitian Operator.	5	CO3	K4
b.	Derive Schrödinger wave equation for a free particle in 1D box.	5	CO3	K3
8.	Draw and discuss the phase diagram for one component system application to Sulphur.	10	CO2	K4

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