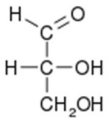
BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: B.TECH/IMSC **SEMESTER: II**
BRANCH: BT/CHEMICAL/CP&P/CIVIL/MECH/PROD/FT **SESSION : SP/2020**

SUBJECT : CH101 CHEMISTRY

TIME: 2 HOURS **FULL MARKS: 25**

INSTRUCTIONS:
1. The total marks of the questions are 25.
2. Candidates may attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

				CO	BL
Q1	(a)	What are the limitations of radius-ratio rule?	[2]	CO1	2
Q1	(b)	Draw Born-Haber cycle for the formation of KCl. Use the given information to calculate the heat of sublimation for potassium. [Heat of formation for KCl(s) = -437 kJ/mol; Electron affinity for Cl = -349 kJ/mol; Ionization energy for K = 418 kJ/mol; Lattice energy for KCl = 717 kJ/mol; Heat of formation for Cl(g) = 122 kJ/mol; Bond dissociation energy for Cl_2(g) = 243 kJ/mol]	[3]	CO1	3
Q2	(a)	Is $MnCr_2O_4$ likely to have a normal or inverse spinel structure?	[2]	CO1	2
Q2	(b)	Which one of the Ni^{2+} or Cu^{2+} complexes show Jahn-Teller distortion?	[3]	CO1	2
Q3	(a)	What are the essential criteria for effective combination of atomic orbitals to form stable molecular orbitals (MO)?	[2]	CO2	1
Q3	(b)	Draw the wave functions of individual hydrogen atoms and show the formation of wave function of bonding and antibonding MO.	[3]	CO2	2
Q4	(a)	Why in general boiling point of cis-isomer is higher compared to trans-isomers?	[2]	CO2	2
Q4	(b)	Predict whether cyclopentadiene anion is aromatic or not? Decide whether the structure drawn have the R or S configuration. 	[3]	CO2	2
Q5	(a)	In which types of reaction order and molecularity are equal? Explain with example.	[2]	CO3	2
Q5	(b)	Show that for parallel reactions ratio of concentration of the products at any time is constant.	[3]	CO3	3

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