Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **M.Sc.I**

FCYC703

7th Semester Regular Examination 2019-20
INORGANIC CHEMISTRY –VI
BRANCH : M.Sc.I(AC)
Time : 3 Hours
Max Marks : 70
Q.CODE : HR242
Answer Question No.1 which is compulsory and any FIVE from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions :** **(2 x 10)**

a) State the structural mechanism of arsenic poisoning and its detoxification methods.

b) Write the names of some macronutrients and micronutrients in biological systems.

c) How the 'cooperative effect' is managed by hemoglobin?

d) Determine the number of vibrational active modes in C_2H_2. How many each of them belong to stretching and bending modes?

e) Derive the structural information for CS_2 molecule, if in it all the vibrations that are Raman active are IR inactive and vice versa. State the name of the rule for it.

f) State examples where change in spectra is observed accompanying change in symmetry upon coordination.

g) State and explain appearance potential in relation to mass spectrometry.

h) Why the nuclei with even number of both protons and neutrons are NMR inactive?

i) Derive the formula for isomer shift in Mossbauer spectra.

j) How many peaks will be observed for ethyl alcohol with low resolution NMR spectroscopy?

Q2 **a)** Analyze the transport mechanism of Na^+ and K^+ pump with reference to ATP hydrolysis. **(5)**

b) Formulate the probable formula of a compound of mass M = 196, whose M+1 peak is 13.4% and M+2 peak is 0.4% of the parent peak. The compound consists of only C, H and O. [Natural abundance of carbon and oxygen are ^{12}C (98.892%), ^{13}C (1.108%) and ^{16}O (99.759%) ^{18}O (0.204%)] **(5)**

Q3 **a)** Illustrate the hydrolysis reaction for Adenosine Triphosphate (ATP) with its reactions **(5)**

b) Justify the concept of polarized and depolarized Raman active lines with reference to the selection rule for it. **(5)**

Q4 **a)** Develop a formula for mass spectrometry to determine M/Z ratio by both magnetic scanning and electric voltage scanning. **(5)**

b) The isomer shift of Fe(II) compounds relative to Fe(0) are generally in the range of +1 to +1.5 mms^{-1}, whereas isomer shift for Fe(III) compounds lie in the range of +0.2 to 0.5 mms^{-1}. Explain these values in terms of the electronic configuration of Fe (0), Fe (II) and Fe(III). **(5)**

Q5 **a)** Explain the concept of Wilson's F and G matrix. What are its applications? **(5)**

b) Analyze the role of Resonance Raman Spectroscopy in the study of biological molecules. **(5)**

Q6 Discuss the role of iron and copper as biological oxygen carriers. Name some of the synthetic oxygen carriers with their structure. **(10)**

Q7 Considering the molecule SF_4, evaluate the number of active IR and Raman lines by using symmetry considerations. (Use Character table for reference) **(10)**

Q8 **Write short answer on any TWO :** **(5 x 2)**

a) Discuss the role of metal ions in biological systems.

b) Chelation therapy.

c) Fermi Resonance.