Enrollment No……

Master of Science (Chemistry)
Third Semester Main Examination, Dec-2020
Bio-Inorganic Chemistry (MSC-303T)

Time: 3:00 Hrs **Max Marks 85**

Note : Attempt all questions. Each question has two parts. Part A is 10 marks and part B is 7 marks.

Q.1 (a) Explain the biological nitrogen fixation.
(b) Write a short note on nitrogenase.

OR

(a) Explain the chemical nitrogen fixation.
(b) Write a short note on synthetic models of electron transfer processes in cytochrome.

Q.2 (a) Describe the thermodynamics & Kinetic of oxygenation.
(b) Explain the hemoglobin with structure.

OR

(a) Describe the catalase and cytochrome P-450.
(b) Explain the myoglobin with structure.

Q.3 (a) Describe the vitamin B_{12} coenzymes.
(b) Write a short note on copper enzyme.

OR

(a) Write a short note on zinc enzyme.
(b) Describe the hemocyanin and hemerithrin.

Q.4 (a) Explain the bulk metals.
(b) Explain the trace metals.

OR

(a) Explain the metal ion in biological systems.
(b) Short note on Na or K pump.

Q.5 (a) Write a short note on- (any 2)
(b) Host guest chemistry.
(c) Molecular asymmetry and prochirality.
(d) Chiral recognition and catalysis.
(e) Crown ethers and cryptates.

Enrollment No……

Master of Science (Chemistry)
Third Semester Main Examination, Dec-2020
Diffraction Method & Photoelectron Spectroscopy (MSC-304T)

Time: 3:00 Hrs **Max Marks 85**

Note : Attempt all questions. Each question has two parts. Part A is 10 marks and part B is 7 marks.

Q.1 (a) Explain the Bragg condition in X-Ray diffraction.
(b) Write a short notes on miller indices.

OR

(a) Explain the Debye scherr method of X-Ray structural analysis of crystals.
(b) Describe the Duane hunt Law.

Q.2 (a) Explain the structure of simple lattices and X-Ray intensities.
(b) Write a short notes on absolute configuration of molecules.

OR

(a) Describe the procedure for an X-Ray structure analysis.
(b) Explain the phenomenon of crystal density.

Q.3 (a) Explain the function of SEM (Scaning Electron Microscopy) for measurement techniques.
(b) Write the differences between electron diffraction and X-Ray diffraction.

OR

(a) Explain the function of TEM (Transmission Electron Microscopy) for measurement Techniques.
(b) Write a short notes on Resolution of electron microscope.

Q.4 (a) Explain the Neutron diffraction.
(b) Explain the Ferro magnetic structure.

OR

(a) Write the applications of Neutron diffraction.
(b) Explain the anti – Ferro magnetic structure.

Q.5 Write a short notes on: (any 4) (Marks 17)
(a) Photo electric effect.
(b) Ionization process.
(c) X-Ray photoelectron spectroscopy (XPS).
(b) ESCA
(e) Basic principle of photoelectron spectroscopy.
(f) Photoelectron spectra of simple molecules.

Enrollment No……

Master of Science (Chemistry)
Third Semester Main Examination, Dec-2020
Molecular Spectroscopy (MSC-301T)

Time: 3:00 Hrs **Max Marks 85**

Note : Attempt all questions. Each question has two parts. Part A is 10 marks and part B is 7 marks.

Q.1 (a) Describe about chromophore and auxochrome.
(b) Explain the effect of solvents and extending conjugation on electronic transition.

OR

(a) What is the steric effect in biphenyls?
(b) Explain the woodward and fiesher rules for conjugated dienes.

Q.2 (a) Discuss the factors influencing the chemical shift.
(b) Explain FT-NMR spectroscopic technique and its advantages.

OR

(a) Calculate the resonance frequency of hydrogen nucleus in an applied field of 2.4T if $\beta_N = 5.05 \times 10^{-27}$ JT^{-1} and g = 5.585.
(b) Write short note on nuclear overhauser effect (NOE) and spin decoupling (double resonance).

Q.3 (a) Discuss the ^{13}C NMR spectral signals of ethoxy methane.
(b) What is the basic principle of COSY and DEPT techniques?

OR

(a) Explain the total number of signal in ^{19}F NMR spectra of following compound :
(i) PF_5 at -4^0C
(ii) PF_5 at 60^0C
(b) Discuss about the HETCOR and NOES techniques.

Q.4 (a) Explain various peaks observed in mass spectra of any organic compound.
(b) Explain the basic principle of electrospray ionization mass spectrometry.

OR

(a) What is the Mc Lafferty rearrangement?
(b) An organic compound ($C_9H_{10}O_3$) exhibited the following spectral data :

IR : 3400, 1680 cm^{-1}

'H NMR : δ 7.8 (1H , d , J = 8 H_z)
7.0 (1H , d , J = 8 H_z)
6.5 (1H , s)
5.8 (1H , s), D_2O exchangeable)
3.9 (3H , s)
2.3 (3H , s)

Find the compound.

Q.5 (a) Outline the principle of Mossbauer spectroscopy.
(b) Explain the applications of Mossbauer theory in the study of Fe(II) and Fe(III) cynides.

OR

(a) Explain the symmetric and asymmetric parameters in Mossbauer spectroscopy.
(b) Describe according to nature of bond (M-L), coordination number and structure in Mossbauer spectroscopy.

Enrollment No……

Master of Science (Chemistry)
Third Semester Main Examination, Dec-2020
Photo Chemistry (MSC-302T)

Time: 3:00 Hrs **Max Marks 85**

Note: Attempt all questions. Each question has two parts. Part A is 10 marks and part B is 7 marks.

Q.1 (a) Explain fate of excited molecules by Jablonski diagram.
(b) Write short note on:-
(i) Quantum yield
(ii) Actinometry

OR

(a) Explain the following:
(i) Types of excitations
(ii) Photochemical reactions
(b) Explain transfer of excitation energy.

Q.2 (a) Describe different types of photochemical reactions with suitable examples.
(b) Explain the determination of reaction mechanism of photochemical reaction.

OR

Discuss the following:-
(a) Gas phase photolysis
(b) Determination of rate constant of reaction

Q.3 (a) Explain the rearrangement of 1,4 and 1,5 dienes.
(b) Define cyclisation reactions.

OR

(a) Describe cis-trans isomerisation of stilbene by the use of photosensitizer.
(b) Explain the photochemistry of alkene.

Q.4 (a) Explain the α-β unsaturated carbonyl compounds.
(b) Describe oxetane formation.

OR

(a) Describe the photochemistry of carbonyl compounds.
(b) Explain cyclohexadienones.

Q.5 Write short note any two of the following.
(a) Barton reaction
(b) Photochemical formation of smog
(c) Photodegration of polymers
(d) Photo-fries rearrangement

Enrollment No……

Master of Science (Chemistry)
Third Semester Main Examination, Dec-2020
Polymer (MSC-306T)

Time: 3:00 Hrs **Max Marks 85**

Note : Attempt all questions. Each question has two parts. Part A is 10 marks and part B is 7 marks.

Q.1 (a) What is polymer? Explain degree of polymerization.
(b) Explain the various classification of polymer.

OR

(a) Describe the linear, branched and network polymer with examples.
(b) Explain the classification and special characteristics of inorganic polymer.

Q.2 (a) Differentiate between addition and condensation polymerization
(b) What is the free radical reaction mechanism for the formation of polymer?

OR

(a) Explain copolymerization with examples.
(b) Describe the polymerization process in homogeneous and heterogeneous systems.

Q.3 (a) Define the number, weight and viscosity average molecular weights.
(b) Write short note on two methods which are applicable for the measurement of molecular weight.

OR

(a) What is polydispersity and molecular weight distribution?
(b) Write short note on analysis and testing of polymers.

Q.4 (a) What is plastics? Classify it.
(b) Explain the reinforcing and fire spinning processes.

OR

(a) What is elastomers and fibers?
(b) Describe the injection moulding, blow moulding and extrusion moulding.

Q.5 (a) Explain the fire retarding polymers.
(b) Briefly explain the boron based polymers.

OR

(a) Describe the phosphorous based polymers.
(b) Explain biomedical polymers with examples.