MEB-4700 Seat No._____

M. Sc. (Sem. I) Examination

November / December – 2018

Chemistry : CHN-402

(Organic Chemistry)

Time : 3 Hours] [Total Marks : 70

Instructions : All questions are compulsory.

1 (A) Answer any **two** of the following : **10**

(1) Explain alternant and non-alternant Hydrocarbon with suitable examples.

(2) Give an explanation of hyper conjugation with suitable examples. Explain Baker-Nathan effect.

(3) What is Annulene ? Discuss the aromatic character of geometrical isomers of [10] Annulene.

(B) Answer any **one** of the following : **4**

(1) Write a short note on catenanes and rotxane.

(2) Explain the types of bonding in fullerins.

2 (A) Answer any **two** of the following : **10**

(1) What is effect of conformation on reactivity ? Explain in detail by taking acyclic and cyclic compounds.

(2) Difference between stereospecific and stereoselective synthesis.

(3) Explain steric strain due to unavoidable crowing.

(B) Answer any **one** of the following : 4

(1) Discuss the stereochemistry of sulphur compounds.

(2) Discuss conformations of decalines.

3 (A) Answer any **two** of the following : 10

(1) What are nitrenes ? Give any two methods of generation of nitrenes. Explain Schmidt rearrange ment.

(2) Write a note : Non classical carbocations.

(3) Discuss Themodynamic and Kinetic requirements of the reaction.

(B) Answer any **one** of the following : 4

(1) Discuss methods of determining mechanism of organic reactions.

(2) Write a note on : Hard and soft electrophiles and nucleophiles.

4 (A) Answer any **two** of the following : 10

(1) Discuss mixed SN^1 and SN^2 mechanism with suitable examples.

(2) Give a brief account of nucleophilic substitution at Allylic carbons.

(3) Discuss effect of the attacking group on nucleophilic substitution.

(B) Answer any **one** of the following : 4

(1) Write a note on Ambident nucleophile.

(2) What is phase transfer catalyst ? Discuss the mechanisms of phase transfer catalyst laying stress in quartenary salt.

5 Answer any **seven** of the following : **14**

(1) Give a charge types for nucleophilic substitutions.

(2) What is cryptands ?

(3) What is Anti aromaticity ?

(4) Define term "Chirality".

(5) What is epimerisation ?

(6) Arrange the isomeric butyl groups in decreasing order of priority.

(7) Give the difference between singlet and triplet carbene.

(8) Explain : Delocalisation of positive charge by hyper conjugation.

(9) Give example of nucleophilic substitution at Vinylic carbon.

(10) Write a Taft equation.

MEB-4710

Seat No._____

M. Sc. (Sem. I) Examination

November / December - 2018

CHN - 403 : Physical Chemistry : Paper - III

Time : 3 Hours] [Total Marks : 70

Instructions :

(1) Each question carries 14 marks.

(2) Figures to the right indicate marks of the question.

1 (a) Answer any **two** of the following : 10

(1) Set up and solve the Schrodinger wave equation for one-dimensional simple harmonic oscillator.

(2) Discuss the applications of variation method taking the example of multi electron system.

(3) Discuss the application of perturbation theory of helium atom.

(b) Answer any **one** of the following : 4

(1) Write a note on "The rigid rotor".

(2) Discuss the various postulates of wave mechanics.

2 (a) Answer any **two** of the following : 10

(1) Explain the Huckel theory of conjugated system.

(2) Discuss spin angular momentum.

(3) Note on Eigenfunctions and Eigenvalue for angular momentum operator.

(b) Answer any **one** of the following : 4

(1) Discuss Pauli's exclusion principle.

(2) Short note Slater-Condon parameters.

3 (a) Answer any **two** of the following : 10

(1) Define Zeroth law, first and second law of Thermodynamics.

(2) Explain : any one method for determination of Partial Molar quantities.

(3) Discuss applications of phase rule to one or three component system.

(b) Answer any **one** of the following : 4

(1) The molar volume of pure methanol is 40 cc/mole. Also the volume of a solution containing 1000 gram of water and 'n' moles of methanol is given by

$V = 1000 + 35n + 0.5\ n^2$

Calculation the partial molar volume for methanol for molality, $m = 0$ and for $m = 1$.

(2) H_2 gas at 1000°C and 300 atm pressure occupies a volume of 0.1191 dm^3/mole. When the values of α are plotted Vs, pressure, the area under the curve is found to be 4.92 atm $dm^3/mole^{-1}$. Calculate the departure from ideal behaviour, α, the fugacity f, and the activity coefficiently for H_2 at 100°C and 300 atm pressure.

4 (a) Answer any **two** of the following : **10**

(1) What is partition function ? Derive an equation for rotational partition function.

(2) Discuss most probable distribution.

(3) Explain entropy production in irreversible thermodynamics.

(b) Answer any **one** of the following : **4**

(1) Calculate the rotational partition function for NH_3 at 27°C.

The three moment of inertia are :

$I_A = I_B = 2.78 \times 10^{-47}$ and

$K = 1.38 \times 10^{-23}$ JK^{-1}

$h = 6.62 \times 10^{-34}$ Js. $I_C = 4.33 \times 10^{-47}$ kg.

σ for $NH_3 = 3$

(2) Explain : Grand Canonical and Micro-canonical ensembles.

5 Answer any **seven** of the following : **14**

(1) Define harmonic oscillator.

(2) Calculate the ionic strengths of solutions that contain

(a) 0.3 M $CaCl_2$

(b) 0.1 M Na_2SO_4 + 0.2 M NaCl

(3) What is meant by activity ? How it is related to pressure and fugacity ?

(4) Give the limitations of phase rule.

(5) Give applications of Extended Huckel Theory.

(6) Definition of Freedom (degree) in phase rule.

(7) By using Stirrling approximation calculate $ln\ N$, where N_A is the Avogadro's number.

(8) Application of Extended Huckel theory.

(9) Explain the terms variation theory.

(10) Give the limitations of the first law of thermodynamics.

* M E B – 4 7 1 9 *

MEB-4719 Seat No._____

M. Sc. (Sem. I) Examination

November / December - 2018

CHN - 404(A) : Group Theory, Spectroscopy & Diffraction Methods

Time : 2 Hours] [Total Marks : 50

1 Answer any **two** : 20

(a) Explain all the terms : Character, Order of a group, Mullikan symbols, similarity transformation.

(b) Find str; in planebending and out at plane bending for $[Ni(CN)_4]$ (square planar) and show their IR and Raman activity.

(c) Explain Boltzman Distribution law. Illustrate spectral line broadening.

(d) Discuss rotational, vibrational and electronic energy levels. Draw and describe Morse energy diagram.

2 Give the answers of any **three** : 20

(a) Explain applications of Mossbauer spectroscopy. Discuss quadrupole splitting.

(c) Give an account of paramagnetic Mossbauer spectra. How can you distinguish high spin and low spin compounds using Mossbauer spectroscopy ?

(c) Illustrate the use of Debye-Scherrer method for crystal analysis.

(d) Considering the example of Naphthalene, explain atomic coordinates and their inversion.

(e) Give an account of structure factor. What is phase problem ? Give its connection to Fourier synthesis.

3 Answer any **five** in brief : 10

(a) Describe the concept of direct product and its utility.

(b) What is goniometer ?

(c) Discuss what is electric field gradient.

(d) Using *x*-ray diffraction, how can you find a rhombohedral crystal ? Give parameters and lattice symmetry of rhombohedral crystal.

(e) Explain nuclear quadrupole. Name at least three nuclei with quadrupolar system.

(f) Distinguish between subgroup and class.

(g) Write the statement of the great orthogonality theorem.

(h) Give one example of molecules having following symmetry point groups : D_{2d}, C_s, Ih, S_4.

(i) Explain dispersion and polarization of light.

(j) Give the statement of Born Oppenheimer approximation.

MEB-4730

Seat No._____

M. Sc. (Sem. I) Examination

November / December - 2018

Physics : EPH - 401

(Electronic Communication)

Time : 2 Hours] [Total Marks : 50

Instructions :

(1) Figures on R.H.S. indicate individual marks.

(2) The symbols have their usual meanings.

1 (a) Answer any **one** of the following : 10

(1) What are the main advantage of using co-axial line over parallel wire line ? Obtain formula for velocity of propagation, line wave length and characteristic impedance for transmission line in terms of primary line parameters.

(2) Using Maxwell's equations obtain necessary equations to describe the propagation of an electromagnetic wave in TE mode in a rectangular wave guide. Obtain formula for cut off wave length.

(b) Answer any **one** of the following : 6

(1) Obtain voltage and current relation with distance from load end on Radio frequency transmission line.

(2) Show that the lowest cut-off frequency for $TE_{1.0}$ is less than $TE_{0.1}$ mode.

(c) Attempt **one** of the following : 4

(1) Determine guide wavelength for a (7.5×2.5) cm^2 guide when it is operating in the TE_{10} mode. Free space wave length is 10 cm.

(2) What length of line is required and how it should be terminated to act as capacitance of 2 pf at 500 MHz. The line impedance is 30 ohms.

2 (a) Answer any **one** of the following : 10

(1) Explain following satellite system parameter.

(i) Back-off loss

(ii) Transmitter power and Bit energy

(iii) Effective isotropic radiated power

(iv) Noise density

(2) What are the basic digital modulation techniques ? Write a detailed note on generation of ASK and detection of ASK binary signals.

(b) Answer any **one** of the following : 6

(1) Explain the characteristics of low, medium and high attitude satellites orbits.

(2) Write a note on FSK transmitter.

(c) Answer any **one** of the following : 4

(1) Write advantages and disadvantages of Geostationary satellite.

(2) Calculate the peak frequency deviation and minimum bandwidth for a binary FSK signal with a mark frequency of 49 KHz, a space frequency of 51 KHz and an input bit rate of 2 kbps.

3 Answer any **five** from following : 10

(1) What do you mean by term "information capacity' ?

(2) What are the advantages of wave guide over co-axial line ?

(3) What do you mean by short circuited transmission line ?

(4) What is the difference between active and passive satellites ?

(5) Define attenuation constant and phase of transmission line.

(6) Define Look Angle.

(7) What is transmission line ?

MEB-4722

Seat No._____

M. Sc. (Sem. I) Examination

November / December - 2018

Botany : EBO - 401

(Biodiversity)

Time : 2 Hours] [Total Marks : 50

Instructions :

(1) There are total four (4) questions in this question paper. All questions are compulsory.

(2) First question in each section carry 20 marks, while the last one carry 5 marks.

(3) Figures to the right indicate marks of questions.

(4) Write answers of each section in separate answer book.

SECTION - I

1 (a) Describe or Discuss in detail : (any **two**) 10

(1) Factors affecting loss of Biodiversity.

(2) Significance of Biodiversity.

(3) Process of Species extinction.

(b) Write short notes on : (any **two**) 6

(1) Loss of Species diversity.

(2) Values of Biodiversity.

(3) Loss in ecosystem diversity of the world.

(4) Types of Biodiversity.

(c) Give answers in brief : (any **two**) 4

(1) Major causes of loss of species diversity.

(2) Explain the term : Genetic diversity.

(3) Significance of Ornamental plants.

(4) The endangered and threatened biodiversity.

2 Give answers in brief : (any **five**) 5

(1) Name any two-alien/invasive plant species of Gujarat.

(2) Define : Biodiversity as per CBD.

(3) Mention the type of process for Extinction.

(4) Write major constituents of pulses and cereals.

(5) Name the plants used as forage.

(6) Write scientific names of at least three medicinal plants with family.

(7) Mention one threatened plant species.

SECTION - II

3 (a) Describe or discuss in detail : (any **two**) 10

(1) Biotechnology and Biodiversity conservation.

(2) Role of educational institute in Biodiversity Conservation.

(3) *Ex-situ* conservation of Biodiversity.

(b) Write short notes on : (any **two**) 6

(1) Biopiracy.

(2) Laws of Biodiversity

(3) Role of Indigenous knowledge system in bio prospecting.

(4) Chipko movement

(c) Give answers in brief : (any **two**) 4

(1) Write full form of : IUCN and its role in conservation of Biodiversity.

(2) Role of IPRs in Biodiversity conservation.

(3) Write complete name of UNEP and its role in Biodiversity management.

(4) Convention on Biodiversity.

4 Give answers in brief : (any **five**) 5

(1) Give the name of National Park located on west coast of India.

(2) Significance of Red Data Book.

(3) Mention complete name of UNESCO.

(4) Differentiate : National Park and Sanctuary.

(5) Write full form of JFM and its role in conservation.

(6) Explain : *in-situ* conservation.

(7) Explain : RET species.

* M E B - 4 6 9 2 *

MEB-4692

Seat No. _____

M. Sc. (Part. I) (Sem. I) Examination

November / December - 2018

CBO - 401 : Botany

(Bacteriology, Phycology, Mycology & Plant Pathology)

Time : 3 Hours] [Total Marks : 70

Instructions :

(1) The question paper consists of two sections, each has two question.

(2) All questions are compulsory. In each section first two questions carry 14 marks and last question carry 7 marks.

(3) There is no overall choice. However, an internal choice has been provided in each question.

(4) Write answer of each section in separate answer sheet.

(5) Illustrate your answers with necessary diagrams, if required.

SECTION - I

1 Answer the following : (two out of three) each of 07 marks : 14

(1) Write in short : Ultra structure of bacterial cell.

(2) Describe Economic importance of bacteria.

(3) Give in detail : autotrophic bacteria.

2 Answer the following : (three out of five) each of 05, 05 and 04 marks : 14

(1) Describe : Haplontic life cycle pattern in algae.

(2) Explain : Sexual reproduction in algae.

(3) Colonial forms of thallus organization in algae.

(4) Write general characters of cyanophyta.

(5) Economic importance of algae.

3 Answer the following : (four out of six) each 02, 02, 02 and 01 marks. 7

(1) Write the general characters of bacteria (any four). 2

(2) Name two asexual methods of reproduction found in bacteria. 2

(3) The bacterial cell wall is made up of _____. 1

(4) Write the general characters of rhodophyceae. (any four) 2

(5) Write the name of sex organsi in *Chara*. 2

(6) Cystocarp consists of _____. 1

SECTION - II

4 Answer the following : (two out of three) each of 7 marks : 14

(1) Write note on : Nutrition of fungi.

(2) Describe : Heterothallism in fungi.

(3) Explain : The role of fungi in medicine and industry.

5 Answer the following : (three out of five) each of 05, 05 and 04 marks : **14**

(1) Describe : Morphological defense mechanism.

(2) Mention the symptoms, causal organism and disease of rusts.

(3) Write the important symptoms of bacterial disease.

(4) Write the general symptoms of smuts disease.

(5) Write in short : Citrus Canker.

6 Answer the following : (four out of six) each 02, 02, 02 and 01 marks : **7**

(1) Define : Karyogamy. **2**

(2) Write the general characters of ascomycotina. (any four) **2**

(3) Write the name of fruit bodies in basidiomycotina. **1**

(4) Give the disease symptoms of downy mildew of grapes. **2**

(5) Explain in short : Necrosis. **2**

(6) Write the name of causal of the organism of black rust of wheat.

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* M E B - 4 7 0 1 *

MEB-4701 Seat No._____

M. Sc. (Sem. I) Examination

November / December - 2018

Botany : CBO - 402

(Bryophytes, Pteridophytes, Gymnosperms & Fossils)

Time : 3 Hours] [Total Marks : 70

Instructions : (1) The question paper consists of two sections, each has three questions.
(2) All questions are compulsory and internal choice is provided.
(3) Write each section in separate answer sheet.
(4) Illustrate your answers with necessary diagrams.

SECTION – I

1 Answer the following : (**two** out of three) **14**
(1) Write note on salient features of the class Anthocerotopsida.
(2) Write note on asexual reproduction of Brayopsida.
(3) Write classification of Liverworts.

2 Answer any **three** out of five each of 05, 05 and 04 marks. **14**
(1) Sporophytes of Psilotels.
(2) Types of stele.
(3) Soral evolution
(4) Outline classification of Pteridophyta.
(5) Write note on Evolution of sporophytes in Filicales.

3 Answer any four out of six each of 02, 02, 02 and 01 marks. 7

(1) What are rhizoids ?
(2) Any two characters of Liverworts.
(3) In *Funaria* Gametophyte phase divided into _____ and _____ stages.
(4) In life cycle of Pteridophytes which stage is dominant ?
(5) What is gametophyte ?
(6) Define : Heterospory.

SECTION – II

4 Answer any **two** out of three : 14

(1) Write note on Ginkgoales.
(2) Write note on the evolution of female gametophyte of gymnosperms.
(3) Explain Rhynia fossil.

5 Answer any **three** out of five. 14

(1) Classification of Gymnosperm.
(2) Characteristic features of Ephadrales.
(3) Give an account on the fall of gymnosperms.
(4) Write note on fossils of Gymnosperms.
(5) Write general account of cordaitales.

6 Answer any four out of six each of 02, 02, 02 and 01 marks. 7

(1) Write any two characteristic features of Efedra.
(2) Draw the structure of female gametopyte of Gnetales.
(3) Who give the term Gymnosperm ?
(4) Ginko known as _____.
(5) What is Fossil ?
(6) Write any two characters of Coniferels.

MEB-4711

Seat No. _____

M. Sc. (Sem. I) Examination

November / December - 2018

Botany : CBO - 403

(Cell Biology & Genetics)

Time : 3 Hours] [Total Marks : 70

Instructions :

(1) There are total six (6) questions in this question paper. All questions are compulsory.

(2) First two questions in each section carry 14 marks each, while the last one carry 7 marks.

(3) Figures to the right indicate marks of questions and in parenthesis of sub-questions.

(4) Write answers of each section in separate answer book.

SECTION - I

1 Describe or discuss in detail : (any **two**) 14

(1) Polythene chromosome

(2) Ultrastructure and chemical composition of nuclear membrane

(3) Lysosomes : Structure, composition and functions.

2 Write short notes on : (any **three**) 14

(1) Non-chromosomal genes in Chlamydomonas. 5

(2) Porky in Neurospora. 5

(3) Applications of male sterility. 5

(4) Pleotropy 4

(5) Parental inheritance. 4

3 Give answers in brief : (any **four**) 7

(1) Explain : Epistasis. 2

(2) Role of cell wall in plants. 2

(3) Explain : Complementary genes. 1

(4) Structure of petite in yeast. 2

(5) Draw the structure of Golgi bodies. 2

(6) Write the function of Peroxissomes. 1

SECTION - II

4 Describe or discuss in detail : (any **two**) 14

(1) Analysis of quantitative characters.

(2) Physical characters

(3) Chromosomal (genetic) mapping.

5 Write short notes on : (any **three**) 14

(1) Law of Independent assortment. 5

(2) Genetic drift. 5

(3) Factors affecting gene frequency. 5

(4) Formula of ratio of allele frequency change under drift.

(5) Hardy-Weinberg genetic equilibrium. 4

6 Give answers in brief : (any **four**) 4

(1) Explain : Mutation. 7

(2) Distinguish : Proto-oncogenes and Celllular oncogenes. 2

(3) Monohybridization and Monohybrid ratio. 2

(4) Explain : Cancer. 1

(5) Distinguish : Genotype and Phenotype. 2

(6) Define : Natural Selection. 2

1