* M C A - 8 2 3 7 *

MCA-8237

Seat No._____

M. Sc. (Sem. I) Examination

January - 2023

Chemistry : Paper - CHNN - 401

(New Course)

Time : **2.30** Hours] [Total Marks : **70**

Instruction : All questions are compulsory.

1 Answer any two of the following questions : **17**

(1) Explain VSEPR theory for CH_4,NH_3 and H_2O.

(2) Describe Walsh diagram for tri-atomic H_2O with proper diagram.

(3) Write a detailed note on $d\pi - p\pi$ bond.

2 Answer any two of the following questions : **18**

(1) Discuss different types of stability constants of complexes.

(2) Explain the effect of nature of ligand and metal ion on the stability of metal complexes.

(3) Describe pH-metry method to determine the binary formation constant.

3 Answer any two of the following questions : 17

(1) Discuss Inert and Labile Complexes.

(2) Describe "Acid hydrolysis" and factors affecting acid hydrolysis.

(3) Explain Cross reaction and "Marcus-hush theory".

4 Answer any two of the following questions : 18

(1) Discuss Crystal field theory and its limitations for coordination compounds.

(2) Construct MOT diagram for $[CoF_6]^{-3}$ octahedral complex.

(3) Explain crystal field splitting in tetrahedral and square planar complexes.

MCA-8246 Seat No. _____

M. Sc. (Sem. I) Examination

January – 2023

CHNN–402 : Chemistry

Organic Chemistry

(New Course)

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

1 Answer any **two** of the following : **18**

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

(2) Discuss Hyperconjugation giving suitable examples and explain Baker-Nathen effect.

(3) Write a short note on Catenanes and Rotaxanes.

2 Answer any **two** of the following : **17**

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

(2) Discuss the stereochemistry of Phosphorus and sulphur compounds.

(3) Difference between Stereospecific and Stereoselective reactions. Explain with suitable examples.

3 Answer any **two** of the following : **18**

(1) What are nitrenes ? Give any two methods of generation and any two chemical reactions of Nitrenes.

(2) Explain Thermodynamic versus kinetic control of reactions.

(3) Giving example discuss Curtin-Hammet principle.

4 Answer any **two** of the following : **17**

(1) Discuss effect of the substrate structure on nucleophilic substitution.

(2) Give a brief account of nucleophilic substitution at Allyilic carbons and vinylic carbon.

(3) What is Auto-oxidation ? Discuss in detail.

MCA-8255

Seat No. _____

M. Sc. (Sem. I) Examination

January - 2023

Chemistry : CHNN-403

(Physical Chemistry)

(New Course)

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

1 Answer any two of the following : **18**

(i) Apply Perturbation theory to non degenerate System.

(ii) Describe briefly the various postulates of Wave Mechanics.

(iii) Short note : Rigid rotator.

2 Answer any two of the following : **17**

(i) Explain the Huckel Theory of Conjugated System.

(ii) Apply Eigen functions and Eigen Value for angular momentum.

(iii) Short note : Pauli Exclusion Principle.

3 Answer any two of the following : **18**

(i) Explain Fugacity. Discuss the methods used to determine its value.

(ii) Define Phase Rule and apply it to Three Component system.

(iii) Calculate Partial Molar Volume for 0.2M solution of NaCl using following equation.

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

4 Answer any two of the following : 17

(i) What is Partition Function ? Derive an equation for Rotational Partition Function.

(ii) Explain Thermodynamics Probability and Most Probable distributions.

(iii) Short note : Grand Canonical and Micro-Canonical Ensembles.

MCA-8264 Seat No._____

M. Sc. (Sem. I) Examination

January - 2023

Symmetry Group Theory & Spectroscopy : CHNN - 404

(Core Compulsory) (New Course)

Time : Hours] [Total Marks : **70**

1 Answer any **two** : **18**

(1) What is plain of symmetry ? Discuss about types of plain.

(2) Find $\sqrt{3N}$ for following molecules H_2O, NH_3, CH_4.

(3) Construction of character table for C_2U using properties of irreducible representation.

2 Answer any **two** : **17**

(1) Discuss the π orbital hybridization schemes for BCL_3.

(2) Discuss the hybridization schemes (σ orbital) for BF_3 (D_3h)

(3) Find out various stratching and bending vibration for $PtCl_4$.

3 Answer any **two** : 18

(1) Discuss uncertainty principle and natural line broadening.

(2) Write short note on selection rules.

(3) Explain absorption, refraction, polarization, scattering and emmission of Emr.

4 Answer any **two** : 17

(1) Discuss the principle of mossbaver spectroscopy.

(2) Write a note on quardrupole splitting.

(3) Give the application of mossbaver spectroscopy.

MCA-8273-8274-8275 Seat No._____

M. Sc. (Sem. I) Examination

January – 2023

CHNN-405 : Chemistry

(1) Computer for Chemists
(2) Computational Chemistry
(New Course)
(3) Organic Spectroscopy

(New Course) (Elective)

Time : Hours] [Total Marks : 35

(1) Computer for Chemists

1 Answer any two of the following : 18

(1) Define the following terms :
  (a) Secondary storage
  (b) I/O devices
  (c) Computer languages

(2) Introduce Linux and Windows in detail.

(3) Discuss the basic structure and functioning of computers with illustration.

2 Answer any two of the following : 17

(1) Define the following :
  (a) Constant and variables
  (b) LOGICAL variables
  (c) DO statement

(2) Develop a small computer program for pH titration.

(3) Explain termination statement.

(2) Computational Chemistry
(New Course)

1 Answer the following questions : (any **Two**) **18**

(1) Short note on advanced programming methods and development needed in Computational Chemistry ?

(2) Short note on Gauss-Seidel and Gauss-Jordan method for linear simultaneous Equations.

(3) Short note on Newton-Raphson methods for solving polynomial and transcendental Equation.

2 Answer the following questions : (any **Two**) **17**

(1) Write a note on basic theory and methodology of Gaussian/Games.

(2) Explain the AB Initio quantum packages and Gauss-Jordan method.

(3) Write a note on Jacobi House Holder methods and its analysis and errors.

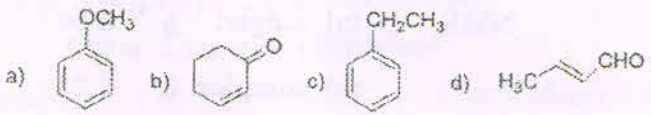
(3) Organic Spectroscopy

(New Course) (Elective)

1 Answer the following questions : (any **two**) **18**

(1) Write short note on proton coupled and proton decoupled spectra.

(2) Short note on splitting of signals and give the signal of following compunds.



(3) What is chemical shift value? Explain, α, β, γ effects on chemical shifts by electronegative atoms/groups.

2 (A) Answer the following questions : (any **one**) **9**

(1) Give the principal and application of mass spectroscopy.

(2) Explain the terms molecular ion peak, Base Peak, Isotope peak, metastable ion peak with example.

(B) Answer the following questions : (any **one**) **8**

(1) MF : C_8H_8O

UV : λ Max 281nm

IR : 3010-3070(m), 2945-2885(m), 1694(s), 1498, 1250(s), 1040(m), 750(s), 685(s)cm^{-1}

NMR : (a) singlet δ 2.46 (3H)

(b) singlet δ 7.50 (3H)

(C) singlet δ 7.85 (2H)

MS : M/e 51 77 105 120

R.a.: (43%) (100%) (80.8%) (23%)

(2) MW : 210

UV : λ Max 258nm and 288nm
(log ε = 2.6 and 2.4)

IR : 3090-3035(m), 2925-2900(m), 1725(s), 1605(s), 1587(s), 1496(s), 1455(s), 750(s), 695(s) cm^{-1}

NMR : (a) singlet δ 3.54

(b) complex δ 7.15

(Relative ratio 2:5)

MS : M/e 211 210 119 91 65

R.a. : 0.11 0.65 16 100 23

(M+1 17% of M)

MCA-8282-8283 Seat No._____

M. Sc. (Sem. I) Examination

January - 2023

Physics

(1) MS PHY 101 ES : Space Physics

(2) MSPHY–102ES : Energy Technology & Storage System (ETS)

(New Course)

Time : 2 Hours] [Total Marks : 35

(1) MS PHY 101 ES : Space Physics

1 (a) Answer any **one** out of two : 6

(1) Derive the equation of Geo potential height.

(2) Explain photo chemical process in ionosphere.

(b) Answer any **two** out of three : 6

(1) Discuss the cause of ionospheric layers.

(2) Explain Chapman's theory of the photo ionization.

(3) Explain morphology of the Ionosphere.

2 (a) Answer any **one** out of two : 6

(1) Explain the theory of photometer for airglow measurement.

(2) Explain the Birkeland's current in magnetosphere.

(b) Answer any **two** out of three : 6

(1) Explain briefly the applications of airglow measurement for ionospheric dynamics and composition.

(2) How does magnetosphere protect earth from radiation ?

(3) Discuss on the function of Magnetosphere?

3 (a) Answer any **three** out of five : 6

(1) How do you find the hydrostatic scale height ?

(2) Why ionosphere is so called ?

(3) What is the difference between atmosphere and thermosphere ?

(4) Give the name of four chemicals that can be harmful to earth atmosphere ?

(5) Define twilight glow and explain its the meaning.

(b) Answer any **five** out of eight : 5

(1) What is Aurora ?

(2) What is tail current in earth magnetic field ?

(3) Define photochemical process.

(4) What is day air glow ?

(5) What is the meaning of glow ?

(6) Which are the main chemicals in Earth atmosphere ?

(7) Which layer is known as ionosphere ?

(8) Name the photometer of airglow measurement.

(2) MSPHY–102ES : Energy Technology & Storage System (ETS)

(New Course)

Instructions : (1) Figures on R.H.S. indicate marks.
(2) The Symbols have their usual meaning.

1 (a) Answer any **one** of the following : **6**

(1) Explain about vapour dominated geothermal electrical power plant with thermodynamic concept.

(2) Giving example and explain how wind power density is estimated.

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

(1) Discuss about geothermal energy resources.

(2) Discuss advantages and limitations of the ocean energy conversion technology.

(3) State limitations of wind energy conservation.

2 (a) Answer any **one** of the following : **6**

(1) Explain energy storage in high pressure hydraulic accumulator.

(2) Explain lead acid battery cell.

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

(1) Which quality must possess for latent heat storage medium ? Write any two merits of Latent heat Storage systems.

(2) Discuss about functioning of advance battery.

(3) List non electrical energy storage systems.

3 (a) Answer any **three** of the following : 6

(1) What is oceanography ?

(2) Define ocean tidal energy.

(3) Define planetary winds and local winds.

(4) What is basic criteria for battery choice?

(5) What is the difference between thermal energy and chemical energy storage system ?

(b) Answer any **five** of the following : 5

(1) What is suitable range of wind for wind turbines ?

(2) How many Celsius average temperatures is increase per kilometer inside the earth with the depth ? (0.25 to 0.30, 2.5 to 3.0, 25 to 30)

(3) What is the unit of air mass flow rate for wind energy calculation ? (Kg-m/s, Kg/s, m^3/s)

(4) Latent heart of vaporizing (L_v) of water is _____ J/Kg. ($2.26* 10^6$, $1.26*10^6$, $0.26*10^6$)

(5) What is the energy storage for ocean wave energy ? (Battery cell, Chemical reactants, Hydro potential)

(6) How many kinds of Geo Thermal stems are there ? (4, 3, 2)

(7) What is SMES ?

(8) Which materials are used for thermal sensible heat storage ?

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MCA-8240

Seat No._____

M. Sc. (Sem. I) Examination

January - 2023

Physics : MSPHY - 101 - CC

(Mathematical Physics - 1 & Programming in C - 1) (New Course)

Time : **2.30** Hours] [Total Marks : **70**

1 (a) Attempt any one : **8**

(1) Write and explain Residue theorem.

(2) Explain mapping and conformal mapping with its one application.

(b) Attempt any two : **8**

(1) State and briefly explain Cauchy theorem.

(2) Discuss Contour Integrals.

(3) Explain the point of infinity.

(c) Attempt any one : **2**

(1) What is mapping ?

(2) Define complex number ?

2 (a) Attempt any one : **7**

(1) Explain Laplace Transform in detail.

(2) Explain Fourier Transform in detail.

(b) Attempt any two : 8

(1) Explain Bromwich integral.

(2) Find Laplace transform of $f(t) = \sin at$ & $f(t) = \cos at$.

(3) Discuss Integral transform solutions of partial differential equations.

(c) Attempt any one : 2

(1) Find Laplace Transform of e^{-at}.

(2) Define convolution.

3 (a) Attempt any one : 8

(1) Explain two dimensional arrays in detail.

(2) Write a note on "for statement" with proper example.

(b) Attempt any two : 8

(1) Explain one dimensional array.

(2) Write a note on while statement.

(3) Explain multidimensional arrays.

(c) Attempt any one : 2

(1) Write statement which is used to skip a part of the statement in a loop.

(2) Define arrays.

4 (a) Attempt any one : 7

(1) Explain comparison of two strings and table of strings.

(2) Explain multifunction program with appropriate block and flow chart.

(b) Attempt any two : 8

(1) Explain no argument and no return value with proper example.

(2) Explain nesting of functions.

(3) Explain declaring and initializing string variables.

(c) Attempt any one : 2

(1) Define nesting of function.

(2) Explain reading and writing strings.

MCA-8249

Seat No._____

M. Sc. (Sem.-I) Examination

January - 2023

MSPHY-102CC : Physics

(Classical Mechanics-1 and Electrodynemics-1)

(New Course)

Time : 3 Hours] [Total Marks : 70

Instructions : (1) All questions are compulsory.
(2) Sign and symbols are usually
(3) Right side number indicate marks.

1 (a) Attempt any **one** : **8**

(1) What is canonical transformation ? Using various generating functions obtain relation between *qi, pi, Qi, Pi* for each other.

(2) Derive Hamilton -Jacobi equations and solve one dimensional harmonic oscillator problem.

(b) Attempt any **two** : **8**

(1) Define Posson's brackets and write its properties.

(2) Obtain condition for transformation to be canonical.

(3) Using method of separation of variable solve the system under central force field.

(c) Attempt any **one** : **2**

(1) Define gauge transformation.

(2) What is generating function ?

2 (a) Attempt any **one** : 7

(1) Explain damped oscillation with appropriate illustrations.

(2) Discuss free motion of a rigid body for Spherical top, rigid rotator and symmetric top.

(b) Attempt any **two** : 8

(1) Explain stable and unstable equilibrium.

(2) Discuss forced oscillations.

(3) Explain normal coordinates and normal frequencies of vibrations.

(c) Attempt any **one** : 2

(1) What is small oscillations ?

(2) What is degree of freedom for small oscillations ?

3 (a) Attempt any **one** : 8

(1) Discuss conductors and dielectrics in detail.

(2) Explain various cases for reflection by a perfect conductor-oblique incidence.

(b) Attempt any **two** : 8

(1) Write note on reflection by a perfect dielectric – Normal incidence.

(2) Explain reflection by a perfect insulator – oblique incidence.

(3) Write note on polarization.

(c) Attempt any **one** : 2

(1) What is surface impedance ?

(2) Write the Maxwell's equations for homogeneous medium.

4 (a) Attempt any **one** : 7

(1) Write and derive Poynting's theorem.

(2) Discuss transverse electric waves (Ez=0) and transverse magnetic waves (Hz=0)

(b) Attempt any **two** : 8

(1) Write note on power loss on plane conductor.

(2) Explain characteristics of TE and TM waves.

(3) Discuss instantaneous and average Poynting vector

(c) Attempt any **one** : 2

(1) What is Parallel plan guides ?

(2) Write complex form of Poynting theorem.

MCA-8258 Seat No._____

M. Sc. (Sem. - I) Examination

January - 2023

MSPHY-103CC : Quantum Mechanics-1
Solid State Physics-1

(New Course)

Time : $2\frac{1}{2}$ Hours] [Total Marks : 70

1 (a) Attempt any **one** : 8

(1) Explain Normal modes of coupled systems of particles.

(2) Discuss The Hilbert space of state vectors with Dirac notation.

(b) Attempt any **two** : 8

(1) Describe Anisotropic oscillator.

(2) Explain Symmetries and conservation laws.

(3) How Unitary transformation induced by rotation of coordinate system ? Explain.

(c) Attempt any **two** : 2

(1) Define Hilbert space.

(2) What is isotropic oscillator ?

(3) "Harmonic oscillator has no non localized states" True or False.

2 (a) Attempt any **one** :

(1) Describe eigen value spectrum of Angular momentum. 7

(2) Explain spin Angular momentum.

(b) Attempt any **two** :

(1) Explain phase convention of C.G. Co-efficients. 8

(2) Discuss Symmetry properties of C.G. Co-efficients.

(3) What is anti-symmetrization ?

(c) Attempt any **two** :

(1) What is pauli principle ? 2

(2) Spin of electron is _____

(3) What is spinors ?

3 (a) Attempt any **one** :

(1) Why nearly free electron model is required ? Discuss model in detail. 8

(2) Explain Kronig- Peney model.

(b) Attempt any **two** :

(1) Discuss Bloch Function. 8

(2) Explain Origin of energy gap

(3) Explain energy band in insulators and metals.

(c) Attempt any **two** :

(1) What is energy band ? 2

(2) What is energy gap ?

(3) "Pure crystals are insulator at absolute zero" True or False.

4 (a) Attempt any **one** : 7

(1) Discuss impurity conductivity.

(2) Derive equation of motion of electron in energy band.

(b) Attempt any **two** : 8

(1) Explain effective mass.

(2) Describe Thermoelectric effect in semiconductors.

(3) Explain thermal ionization of donors and acceptors.

(c) Attempt any **two** : 2

(1) What is holes ?

(2) Define mobility.

(3) Number of independent orbitals in energy band is _____.

(A) N
(B) 2N
(C) 3N
(D) 4N

MCA-8267

Seat No. _____

M. Sc. (Sem. I) Examination

January - 2023

Physics : MSPHY-104CC

(Electronics-1)

(New Course)

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) Symbols have their usual meanings.

(2) Figure indicated on right hand side are individual marks.

1 (a) Answer the following (Any One) **8**

(1) Describe construction and operation of an Astable Multivibratore.

(2) Explain FET Small signal models and derive necessary equations for Common source A.C. Amplifier.

(b) Answer the following (any **two**) **8**

(1) Discuss Common Gate Amplifier.

(2) Explain Q-point and DC Load Line for JFET.

(3) Application of Handling precaution of MOSFET.

(c) Answer the following (any **one**) **2**

(1) What is ac drain resistance ?

(2) Give an equation of frequency of free running multivibrator.

2 (a) Answer the following (any **one**) 7

(1) Derive power and efficiency of a Class B Power Amplifier.

(2) Discuss single tuned inductively coupled transistor amplifier.

(b) Answer the following (any **two**) 8

(1) Describe differences between Voltage Amplifiers and Power Amplifiers.

(2) Explain only Operation of the Transformer Couple Class A Power Amplifier.

(3) Explain transformer coupled Class A amplifier.

(c) Answer the following (any **one**) 2

(1) What is Resonant Circuit ?

(2) Classify the Power Amplifiers.

3 (a) Answer the following (Any One) 8

(1) Discuss high pass R-C circuit for Pulse Input and Square Wave Input.

(2) Explain Shunt Diode Clippers.

(b) Answer the following (any two) 8

(1) Explain Low Pass R-C circuit as an Integrator.

(2) Discuss high Pass R-C circuit as a Differentiator.

(3) Application of a Positive Peak Clipper.

(c) Answer the following (any one) 2

(1) Compare Shunt diode clippers with Series diode clippers.

(2) Draw any four type waves used in electronics.

4 (a) Answer the following (any one) 7

(1) Discuss the different steps involved in fabricating a Monolithic Integrated Circuit.

(2) Explain construction of transistors and diodes in Monolithic Integrated Circuits.

(b) Answer the following (any **two**) 8

(1) Explain Monolithic Integrated Resistors Circuit.

(2) Describe a system for production growth of silicon epitaxial layers.

(3) Application of the 555 IC timer as a Monostable and Astable Multivibrator.

(c) Answer the following (any **one**) 2

(1) What is Monolithic ?

(2) What is Photo Masking in monolithic technique ?

MCA-8238

Seat No._____

M. Sc. (Sem. I) Examination

January - 2023

Botany : BOC - 101

(Biology & Diversity - I) (Virus, Bacteria, Algae, Fungi & Plant Pathology) (New Course)

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) This question paper consists of total four questions.

(2) All questions are compulsory and caring 18, 17, 18 and 17 marks respectively.

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

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

1 Answer the following as per Instruction : **18**

(a) Explain in detail : (any one) **8**

(1) Ultra structure of TMV.

(2) Autotrophic mode of nutrition of bacteria.

(b) Explain in brief : (any one) **7**

(1) General characteristics of Virus.

(2) Economic importance of bacteria.

(c) Give short answers : (any three) **3**

(1) What is genetic material of Corona virus ? DNA or RNA.

(2) Write the example of Cyanobacteria.

(3) Write the full form of NAG.

(4) Which organelle is responsible for synthesis of respiratory enzymes in bacteria ?

(5) Draw a labelled diagram only : Bacteriophage virus.

2 Answer the following as per Instructions : **17**

(a) Explain in detail : (any one) **8**

(1) Modes of Reproduction in algae.

(2) Colonial forms in algae.

(b) Explain in brief : (any one) **6**

(1) Distinguishing characters of Rhodophyta.

(2) Algae as a Biofertilizer.

(c) Give short answers : (any three) **3**

(1) Name one algae showing false branches.

(2) What is the name of female sex organs of Chara ?

(3) Explain the word : Algal bloom.

(4) Draw a labelled diagram only : unilocular sporangia.

(5) Name the alga which is source of Agar-Agar.

3 Answer the following as per Instructions : **18**

(a) Explain in detail : (any one) **8**

(1) Role of Fungi in Industry and medicine.

(2) Heterothallism.

(b) Explain in brief - (any one) **7**

(1) Nutrition of fungi.

(2) General characteristics of Basidiomycotina.

(c) Give short answers : (any three) 3

(1) Members of Eumycota are commonly known as ____.

(2) The fungal cell wall is made up ____.

(3) Which group (Sub division) fungi is known as Sac fungi.

(4) Define term mycelium.

(5) What is Plasmogamy ?

4 Answer the following as per instructions : 17

(a) Explain in detail : (any one) 8

(1) Describe general symptoms of plant disease.

(2) Tikka disease of Groundnut.

(b) Explain in brief : (any one) 6

(1) Bacterial blight of Paddy.

(2) Biochemical defense mechanism.

(c) Give short answers : (any three) 3

(1) What is necrosis ?

(2) Write the name of causal organism of Late blight of Potato.

(3) Define term Pandemic.

(4) Write the types of dissemination.

(5) What is canker ?

MCA-8247

Seat No. _____

M. Sc. (Sem.-I) Examination

January - 2023

BOC-102 : Botany

(Plant Taxonomy)

(New Course)

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) This question paper consists total four questions.
(2) All questions are compulsory and carrying 18, 17, 18 and 17 marks respectively.
(3) There is no overall choice. However, an internal choice has been provided in each sub-question.
(4) Illustrate your answers with necessary diagrams, if required.

1 Answer the following as per instruction. **18**

(a) Explain in detail – any **one** : **8**
(1) Evolution of Angiosperms.
(2) Herbarium methodology.

(b) Explain in brief – any **one** : **7**
(1) Principles and Aims of Taxonomy.
(2) Genus and Species as Taxonomic category.

(c) Give short answers – any **three** : **3**
(1) $HgCl_2$ is used for which purpose in preparing Herbarium ?
(2) What is plant taxonomy ?

(3) The *Isoetes* – Monocotyledon theory was proposed by _____

(4) Eichler, Engler and Prantil treated _____ as the probable ancestors of Angiosperms.

(5) Botanical gardens are *in situ* / *ex situ* conversion method.

2 Answer the following as per Instruction : 17

(a) Explain in detail – any **one**. 8

(1) Bentham and Hooker's classification system.

(2) ICBN – typification

(b) Explain in brief – any **one**. 6

(1) Binomial nomenclature.

(2) Merits and demerits of Bassey's classification system.

(c) Give shot answers : (any **three**) 3

(1) Give the full name of APG.

(2) What is phylogenetic classification system ?

(3) Takhtajan's classification system is based on _____ characters.
(artificial, natural, phylogenetic)

(4) Bentham and Hooker classify gymnosperms into _____category.

(5) Demerit of APG classification system.

3 Answer the following as per Instruction : 18

(a) Explain in detail – any **one** : 8

(1) Hot spots of India.

(2) Endemic plants of Gujarat.

(b) Explain in brief – any **one** : 7

(1) Morphological characters in relation to Taxonomy.

(2) Computers as the tool of Taxonomy.

(c) Give short answers – any **three** : 3

(1) What is GIS ?

(2) Use of Monographs.

(3) Genus *Trapa* is treated as separate family, before that it was included in _____ family.

(4) Which cytological character is very important Taxonomy ?

(5) What is Flora ?

4 Answer the following as per Instruction : 17

(a) Explain in detail : (any **one**) 8

(1) Distinguishing characters of Rutaceae.

(2) Floral characters, floral diagram and floral formula of Capparaceae.

(b) Explain in brief : (any **one**) 6

(1) Inflorescences of Euphorbiaceae.

(2) Economic importance of Poaceae.

(c) Give short answers – any **three** : 3

(1) Only two stamens are present in _____ family.

(2) Meliaceae belongs to _____ order of Bentham and Hooker's classification system.

(3) Trimerous flowers are present in _____ family.
(liliaceae, apiaceae, boraginaceae)

(4) Gynostagium is the characteristic of _____ family.

(5) Sterile stamens are found in _____ genus of Amaranthaceae.

MCA-8256 Seat No._____

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

January - 2023

BOC - 103 : Botany : Paper - III

(Cell Biology) (Core) (Theory) (New Course)

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) Figures on the right side shows the mark of questions.

(2) Write your answer number according to questions number.

1 (a) Answer the following : (any **1** out of 2) **8**

(i) Describe : Cell wall structure

(ii) Describe : Function of Mitochondria.

(b) Answer the following : (any **1** out of 2) **7**

(i) Describe : Types of Ribosomes.

(ii) Describe : Plasma membrane functions.

(c) Answer the following : Objective type **3**
(any **3** out of 5)

(1) What is Plasmodesmata ?

(2) What is Granum ?

(3) What is Phagosomes ?

(4) Which organelles known as 'Powerhouse' of cells ?

(5) What is Rough Endoplasmic reticulum ?

2 (a) Answer the following : (any **1** out of 2) **8**

(i) Describe : First Phase of Mitosis.

(ii) Describe : Microtubules.

(b) Answer the following : (any **1** out of 2) **6**

(i) Describe : Second Phase of Meiosis.

(ii) Describe : Programmed Cell Death

(c) Answer the following : Objective type **3**

(any **3** out of 5)

(1) What is Cell Cycle ?

(2) What is role of spindle in Cell division ?

(3) What is Role of Flagella ?

(4) In which cell division stage, daughter nuclei separated in two Halves ?

(5) What is Apoptosis ?

3 (a) Answer the following : (any **1** out of 2) **8**

(i) Describe : Nucleosome organization.

(ii) Describe : Polytene Chromosome.

(b) Answer the following : (any **1** out of 2) **7**

(i) Describe : Function of Nucleus.

(ii) Describe : Karyotype Analysis.

(c) Answer the following : Objective type **3**

(any **3** out of 5)

(1) Role of Nucleopores in Nucleus.

(2) What is Centromere ?

(3) What is Euchromatin ?

(4) What is Telocentric Chromosome ?

(5) In which part DNA found in cell structure ?

4 (a) Answer the following : (any **1** out of 2) **8**

(i) Describe : Cell Fixative and Stains.

(ii) Describe : Cytometry.

(b) Answer the following : (any **1** out of 2) **6**

(i) Describe : Light Microscope.

(ii) Describe : FISH

(c) Answer the following : Objective type **3**

(any **3** out of 5)

(1) Give example of Acidic Stains.

(2) What are the uses of Phage Contrast Microscope ?

(3) What is condenser and its use in Compound Microscope ?

(4) What is full name of GISH ?

(5) What is magnification power of Electron Microscope ?

MCA-8265

Seat No. _____

M. Sc. (Sem. I) Examination

January - 2023

BOC-104 : Botany : Paper-104

(Genetics and Evolution) (New Course)

Time : 2:30 Hours] [Total Marks : 70

Instructions : (1) All questions are compulsory.
(2) Figures to the right indicate marks of sub-questions.
(3) Illustrate your answers with neat and labeled diagram if required.

1 (A) Answer the following question in brief (any one). **8**

(1) Fine structure of gene.

(2) Male sterility in Zea mays.

(B) Write short note (any one) **7**

(1) Wobble hypothesis.

(2) Initiation and termination of codons.

(C) Answer the following questions in very short (any three). **3**

(1) Which is equivalent of a structural gene --- Muton/Cistron/Recon.

(2) Define - Split genes.

(3) Who has discovered genetic Code ?

(4) Define - Extra chromosomal in-heritance.

(5) What is meant by fine structure of gene ?

2 (A) Answer the folowing questions in brief (any **one**). 8

(1) Substitution mutation.

(2) Transposons in Eukaryotes.

(B) Write short notes : (any one) 6

(1) Physical mutagens.

(2) Ac-Ds system.

(C) Answer the following question in very short (any three). 3

(1) Which enzyme catalyzes the transposition of an IS elements ?

(2) Give the type of non-composite transposon.

(3) What is the result by point mutation ?

(4) C=G is replaced by A=T; which type of mutation occurs ?

(5) Define : Spontaneous Mutation.

3 (A) Answer the following questions in brief : (Any One) 8

(1) Multiple allele.

(2) Polygenic inheritance.

(B) Write short note (Any One) 7

(1) Incomplete linkage.

(2) Three point test cross.

(C) Answer the following question in very short : (Any Three) 3

(1) Multiple alleles arise from the same allele by mutation . True or False.

(2) Crossing over takes place in ____ stage of meiosis.

(3) There are 4 pairs of chromosomes in a Drosophila. _____ Linkage groups present in it.

(4) Coupling and Repulsion are two faces of _____.

(5) Which type of ratio is obtained by supplementary factor ?

4 (A) Answer the following questions in brief : (Any One) 8

(1) Concepts of 'adaptation'.

(2) Experiment of Miller (1953)

(B) Write short note (Any One) 6

(1) Anaerobic metabolism.

(2) Plant diversity.

(C) Answer the following questions in very short (Any Three) 3

(1) Give the intermediate products of the reaction in Millers experiment.

(2) Which are coacervate chemicals according to Oparin concept ?

(3) Which is the book in which Darwin published the theory of evolution ?

(4) Which is the most critical factor for evolution according to Darwin ?

(5) What is abiotic synthesis of polymers ?

MCA-8276-8277-8278 Seat No. _____

M. Sc. (Sem. I) Examination

January – 2023

Botany

(1) BOE-101 : Bio Fertilizer Technology

(New Course)

(2) BOE-102 : Environmental Biology

(New Course)

(3) BOE-103 : Biodiversity

(New Course)

Time : **2** Hours] [Total Marks : **35**

(1) BOE-101 : Bio Fertilizer Technology

(New Course)

Instructions : (1) This question paper consists total three questions.

(2) All questions are compulsory and carrying 14, 14 and 07 marks respectively.

(3) Illustrate your answers with necessary diagram, if required.

1 (a) Answer the following : one out of two : **8**

(1) Types and application of bio fertilizers in agriculture.

(2) Regulation of nitrogen fixation.

(b) Answer the following : one out of two : **6**

(1) Characteristics of *Rhizobium* and *Azolla* as a Bio fertilizer.

(2) Mechanism of action of nitrogenase.

2 (a) Answer the following : one out of two : 8

(1) *Rhizobium*-Legume symbiosis.

(2) Standards and quality control technology.

(b) Answer the following : one out of two : 6

(1) Strain selection and sterilization technology.

(2) Application for field and tree crops.

3 Answer the following : seven out of ten : 7

(1) Symbiotic relation between root and fungi is called ____.

(2) What is *nif*-gene ?

(3) What is bio fertilizer ?

(4) Write any two role of nitrogenase enzymes.

(5) The main function of bio fertilizer is ____.

(a) To increase physiological process

(b) To increase biological process

(c) To increase photosythetic process

(d) None of the above

(6) A good soil pH range for most nursery plant would be _____.

(7) Seed treatment is done to control _____.

(8) _____ is not a product of fermentation. (Lactate/Oxygen/Carbon dioxide)

(9) Which is the suitable medium for cultivation of *Azospirillium* ?

(10) A free living nitrogen fixing cynobacterium which can also form symbiotic association with *Azolla* is _____.

(2) BOE-102 : Environmental Biology
(New Course)

Instructions : (1) This question paper consists total four questions.

(2) All questions are compulsory and caring 14, 14 and 07 marks respectively.

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

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

1 Answer the following as per instruction : **14**

(a) Explain in detail : (any one) **8**

(1) Ecosystem - Types, structure and function.

(2) Phyto-sociologyal characters and methods of plant community.

(b) Write Short notes : (any one) **6**

(1) Niche.

(2) Nitrogen cycle.

2 Answer the following as per instruction : **14**

(a) Explain in detail : (any one) **8**

(1) Major biomes of the world.

(2) Environmental education-goals, objectives and principles.

(b) Write Short notes : (any one) **6**

(1) Plant indicators.

(2) Acid rain and green house gases.

3 Answer the following in very short : (any seven) 7

(1) Which gas produced maximum environmental pollution ?

(2) What is the chemical composition of the atmosphere ?

(3) Define : Mortality.

(4) Write fullform of ICUN.

(5) Write name of wildlife santuries in Gujarat.

(6) Write name of forest research centre in India.

(7) Which layer known as a earth protected umbrella ?

(8) Define : Natality.

(9) Define : Ecotype.

(10) Write name of two major environmental fectors.

(3) BOE-103 : Biodiversity
(New Course)

Instructions :

(1) All questions are compulsory.

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

(3) Illustrate your answers with neat and labeled diagrams if required.

1 (A) Describe : (Any **One**) 8

(1) Law of genetic diversity.

(2) Factors affecting in loss of biodiversity.

(B) Write short notes : (Any **One**) 6

(1) Biodiversity values.

(2) Species diversity.

2 (A) Describe : (Any **One**) 8

(1) Intellectual property rights.

(2) Conservation of genetic diversity.

(B) Write short notes : (Any **One**) 6

(1) ICAR.

(2) Biopiracy

3 Answer the following questions in short : (Any **Seven**) 7

(1) What is biodiversity ?

(2) What is ecosystem ?

(3) Define : Genetic diversity.

(4) What is depletion of biodiversity ?

(5) Give the full form of NBPGR.

(6) What is conservation ?

(7) What is Chipko movement ?

(8) What are canes ?

(9) What is a biodiversity hotspot ?

(10) Define : Ecological Diversity.
