RH-911 Seat No. _____

M. Sc. (Sem. III) Examination

October - 2023

Organic Chemistry : CHNN-601(O)

(Natural Products)

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

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

(1) What are natural pigments? Give the structure and synthesis of cyanin chloride.

(2) Discuss the hydrolysis of chlorophyll-a and chlorophyll-b under different condition. Give name of oxidation and reduction product of chlorine-e.

(3) Discuss the structural determination and biogenetic relationship between chrysin, quercetin, daidzein and dihydro flavone.

(4) Explain one method to synthesize dipyrrylmethenes. Draw the structure of aetioporphyrin, mesoporphyrin and protoporphyrin.

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

(1) What are sesquiterpenes? Write in detail about chemistry of gibberellin-A.

(2) Discuss the constitution of zingiberene.

(3) Discuss Ruzicka work to confirm the position of carboxylic group, double bonds and angular methyl group in abietic acid.

(4) Give the synthesis of eudelene and squalene.

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

(1) What are Vitamins? Discuss their classification and nomenclature. Explain in brief: biological importance of vitamins.

(2) Discuss the constitution of pantothenic acid.

(3) Give analytical evidences for the structure of adermin (pyridoxine).

(4) Describe the structure and Gorlich's synthesis of ascorbic acid.

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

(1) Discuss the general biogenetic studies of alkaloids.

(2) Discuss on the following for strychnine,

(i) Nature of 'N' atom.

(ii) Oxidation with HNO_3, H_2SO_4 and $KMnO_4$.

(3) Give evidence on the structure of colchicine and its synthesis.

(4) Write in detail about the constitution of reserpine.

RH-915 Seat No._____

M. Sc. (Sem. III) Examination

October – 2023

CHNN–602(O) : Organic Chemistry : Paper-2

(Industrial Chemistry)

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

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

(1) What is a unit process ? Explain the industrial aspects of suphonation.

(2) Explain the importance of research and development in chemical industries.

(3) What are the design flowcharts ? Explain their usefulness with proper examples.

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

(1) Write a note on : Food preservatives.

(2) What are fatty alcohols ? Explain their importance and manufacture.

(3) Write a note on : Fruit concetrates.

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

(1) Write a note : Rodenticides.

(2) Define : vegetable oils. Explain the manufacture of cotton seed oil.

(3) Write a note on : Plant hormones.

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

(1) Define : Pulp. Give its uses. Explain Kraft process.

(2) Define : Rayon. Explain the manufacture rayon.

(3) Write a note on : manufacturing of ethanol from sugars.

RH-919 Seat No. _____

M. Sc. (Sem. III) Examination

November – 2023

CHNN603(O): Organic Chemistry

(New Course)

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

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

(1) Describe the term Pharmacopeia. Write a note on modern method of pharmaceutical analysis.

(2) Write definition examples and uses of Vehicles, Suspending agents, Surfactants and Emulsifying agents.

(3) How are Organic medicinal compound named ? Explain QSAR in brief.

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

(1) Define an Antibiotic. Give the classification of antibiotics based upon their mode of action.

(2) Explain the constitution and synthesis of Chloramphenicol.

(3) What are Cephalosporins ? Name first generation cephalosporins. Synthesize any two such drugs.

3 Answer any **two** following : 18

(1) Give the synthesis and uses of Sulfalene and Trimethoprim.

(2) Give the mechanism of action and metabolism of various sulpha drugs.

(3) Give the synthesis and uses of Sulphafurazone and Sulphamerazine.

4 Answer any **two** following : 17

(1) Give an account on Cholinergic drugs. Sysnthesis uses and physiological activities of any two cholinergic drugs.

(2) Give an account on Histamine drugs. And Synthesis of Mepyramine and Chlorphenyramine.

(3) Explain classification of local anaesthetics. Synthesis of any two anilide derivatives used as anaesthetics.

RH-924 Seat No.

M. Sc. (Sem. III) Examination

November - 2023

Organic Chemistry : CHNN-604(O)

(New Course)

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

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

(a) Discuss nomenclature and classification of Heterocyclic compound.

(b) Write note on synthesis and chemical reactivity of imidazole.

(c) Give synthesis of Oxazole and Thiazole.

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

(a) Give skraup synthesis for Quinolone.

(b) Give reaction and synthesis of Bicyclic Heterocyclic compounds of Isoquinoline.

(c) Discuss electrophillic substitutions of substituted Quinoline and Isoquinoline.

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

(a) Write application of Oxidation Reagent : $Na_2Cr_2O_7$.

(b) Write a note on oxidizing reagent : CF_3COOH.

(c) Synthesis and uses of alluminium iso-propoxide with mechanism.

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

(a) Give application of Diisobutyl alluminium hydrice with preparation.

(b) Synthesis and uses of sodium cyano brohydride.

(c) Write a note on applications of $NaBH_4$ on aldehyde, ketone and ozonides.

RH-928-929 Seat No._____

M. Sc. (Sem. III) Examination

November – 2023

Chemistry (O)

(1) CHNN–605(A) : Green Chemistry (Elective)
(2) CHNN–605(B) : Photo Chemistry (New Course) (Elective)

Time : 2 Hours] [Total Marks : 35

(1) CHNN–605(A) : Green Chemistry (Elective)

Instructions : (1) There are total two questions in question paper.

(2) All questions are compulsory.

(3) Figures to the right indicate the full marks.

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

(1) Write a note on green chemistry in everyday life.

(2) Discuss in details basic need for green chemistry according to environmental approach and write its benefits.

(3) Discuss the principle of green chemistry. Explain the classical and manmade appropriate two illustrations of each class.

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

(1) Discuss green reaction conditions. Explain green synthesis of any two reagents.

(2) Write a note on : Phase transfer catalysts and biocatalysts.

(3) Describe the uses of renewable feed stock.

(4) Explain brief account of the following terms.

(i) Catalysis

(ii) Energy efficiency

(iii) Green solvents

(2) CHNN–605(B) : Photo Chemistry (New Course) (Elective)

Instruction : All questions are compulsory.

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

(1) Draw and discuss Jablonski diagram.

(2) What is isomerism? Explain geometrical isomerism with example.

(3) Discuss the photochemical cycloaddition reaction between benzophenone and 1,3-butadiene.

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

(1) Explain Norrish type I and II cleavages in photochemical reactions.

(2) Explain the intramolecular reaction of cyclohexadienones.

(3) Discuss photochemistry of carbonyl compounds in cyclic and acyclic compounds.

RH-956 Seat No._____

M. Sc. (Sem. III) Examination

October - 2023

Physics : MSPHY-301CC

(Nuclear Physics - I & Instruments) (New Course)

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

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

(2) The symbols have their usual meanings.

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

(1) In case of effective range theory in n-p scattering, derive the expression for the total cross-section

$$\sigma = \frac{3\pi}{k^2 + \left(\frac{1}{a_t} - \frac{r_t k^2}{2}\right)^2} + \frac{\pi}{k^2 + \left(\frac{1}{a_s} - \frac{r_s k^2}{2}\right)^2}$$

(2) Discuss meson theory of nuclear forces.

(b) Answer the following : (any **two** out of three) **8**

(1) Explain magnetic moment of deuteron.

(2) Discuss singlet state of n-p system.

(3) Explain excited states of the deuteron.

(c) Answer the following : (any **one** out of two) **2**

(1) Explain nuclear spin.

(2) Write formula of differential cross-section for elastically scattered particles for all values of l.

2 (a) Answer the following : (any **one** out of two) 7

(1) In case of Breit-Wigner dispersion formula, the amplitude for state of energy is $A_E = \frac{\Psi_0}{2}\left[\frac{i\hbar}{E - E_r + i\gamma/2}\right]$. then Derive Breit-Wigner one level formula for spinless nuclei and $l = 0$.

(2) Define compound nucleus and derive the relation between Probability of decay of compound nucleus $G_C(x)$ and scattering cross-section of formation of compound nucleus $\sigma_C(x)$.

(b) Answer the following : (any **two** out of three) 8

(1) Discuss different conservation laws of nuclear reactions in brief.

(2) In case of continuum theory of cross section, obtain the expression

$$\sigma_C = \pi(R + \lambda\!\!\!^{-})^2 \frac{4kK}{(k+K)^2}$$

(3) State main characteristics of direct reactions.

(c) Answer the following : (any **one** out of two) 2

(1) What is meant by nuclear resonance?

(2) What do you mean by direct reactions?

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

(1) Discuss the construction and working of scanning electron microscopy (SEM).

(2) Explain principle and working of transmission electron microscopy (TEM).

(b) Answer the following : (any **two** out of three) 8

(1) Write applications of transmission electron microscopy (TEM).

(2) Write advantages and drawbacks of scanning electron microscopy (SEM).

(3) Discuss the part of scanning force microscopy (SFM) in brief.

(c) Answer the following : (any **one** out of two) 2

(1) Explain constant current mode in scanning tunneling microscopy (STM).

(2) Write any two applications of scanning tunnelling microscopy (STM).

4 (a) Answer the following : (any **one** out of two) 7

(1) Discuss instrumentation of UV-Visible spectroscopy in detail.

(2) Explain the working of UV- visible single beam spectrometer.

(b) Answer the following : (any **two** out of three) 8

(1) Explain Beer-Lambert law.

(2) Discuss in brief the electronic transition of absorbing species containing π, σ and η.

(3) A 0.01 molar solution of a compound transmits 20% of the radiation in a container with path length equal to 1.5 cm. Calculate the molar extinction coefficient of the compound.

(c) Answer the following : (any **one** out of two) 2

(1) Draw only the diagram of double beam spectrometer arrangement.

(2) Write any four applications of UV-visible spectroscopy.

RH-957 Seat No._____

M. Sc. (Sem. III) Examination

October - 2023

MSPHY 302 CC : Physics

(Statistical Mechanics-2 & Computer-2)

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

Instructions : (1) Symbols have their usual meaning.
(2) Figures to the right indicate marks of the question.

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

(1) Explain the Phase diagram for transitions of solid liquid and vapour.

(2) Derive first order Vanderwaals equation for real gas with an isotherm plotted on a PV plane.

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

(1) Derive an equation of heat capacity of vapour in equilibrium of Clausius - Clapeyron equation.

(2) Explain second order phase transitions.

(3) Explain Phase Transiton in Ferromagnetic materials.

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

(1) Draw a graph of C_p---T for liquid Helium.

(2) Discuss vapour pressure curve of liquid-vapour equilibria in case of Clausius - Clapeyron equation.

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

(1) What is the thermionic emission? Derive Richardson Dushman equation for thermionic emission.

(2) Explain Photo-electric effect and derive an equation of current density.

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

(1) Discuss mean collision time.

(2) Explain Effusion and derive necessary equations.

(3) Derive Boltzmann transport equation.

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

(1) What is molecular collisions and derive an equation of pressure.

(2) Write down an equation of Einstein's relation and coefficient of diffusion and its importance.

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

(1) Write down note on MS Excel and give the salary roll application of it.

(2) Explain standard toolbar and formatting toolbar.

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

(1) Explain the graphs in MX Excel.

(2) Explain "recovering the deleted workbook" in the manipulating data in MS Excel.

(3) What is the function of MS Excel for selecting a command and types of data?

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

(1) How can you renaming sheet and entering a data in MS Excel?

(2) How can you deleting data from the cell address of MS Excel.

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

(1) Explain LAN, MAN and WAN with proper diagram.

(2) Explain importance of internet and discuss web browser and search engine.

(b) Attempt any **two** 8

(1) What is viorus? Indicate classification of viruses.

(2) Explain Mesh Topology of network theorem with figure.

(3) Which are the precautions for the Internet Security?

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

(1) Write downs any four different network topologies possible.

(2) What is internet surfing?

RH-958

Seat No. _____

M. Sc. (Sem. III) Examination

November - 2023

Physics : MSPHY303CC

(Quantum Mechanics-3 & Solid State Physics-3)

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

Instructions : (1) Symbols have their usual meanings.
(2) Figures on RHS indicate the marks of individual questions.

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

(1) Define differential and total cross-sections. Also, describe the wave mechanical picture of scattering and define scattering amplitude.

(2) Write Green's function for the operator Ω and explain it. Obtain an expression for the scattering amplitude using Green's function method.

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

(1) Write note on Eikonal Approximation.

(2) Explain the Born approximation in scattering calculation.

(3) Write note on Born series.

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

(1) Defie impact parameter.

(2) Define screened coulomb potential with necessary formula.

2 (a) Attempt any one : 7

(1) Explain Reduction of the two body problem for the centre of mass frame and obtain the formula, $\left[-\frac{\hbar^2}{2m}\nabla^2 + V(x)\right]u_n(x) = E_n u_n(x)$

(2) Describe asymptotic behaviour of partial wave for scattering and discuss about phase shift.

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

(1) Discuss Ramsauer Townsend Effect.

(2) Discuss collision between identical particles for Spinless particles and Spin-1/2 particles.

(3) Write note on the scattering amplitude in terms of phase shifts.

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

(1) What are partial waves?

(2) Define resonance scattering.

3 (a) Attempt any one : 8

(1) Explain Courie Point and the exchange integral in detail.

(2) What is domains? Write about origin of domains. Discuss single domain particles.

(b) Attempt any two : 8

(1) Explain Antiferromagnetic Magnons in detail.

(2) Write a note on "Thermal Excitatior of Magnons".

(3) Explain neutron magnetic scattering.

(c) Attempt any one : 2

(1) Explain anisotropy energy.

(2) What are soft and hard ferromagnets?

4 (a) Attempt any one : 8

(1) Derive equation of motion (known as Bloch equations) which describes resonance process.

(2) Describe principle of MASER action.

(b) Attempt any two : 8

(1) Explain spin wave resonance.

(2) Describe shape effects in FMR.

(3) Explain in detail "knight shift".

(c) Attempt any one 2

(1) Define Zero-field splitting.

(2) Write full ferm of EPR, CESR.

RH-959 Seat No._____

M. Sc. (Sem.-III) Examination

November - 2023

Physics

MSPHY-304 CC : Electronics-III

(New Course)

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

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

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

(1) Define pulse time modulation (PTM)? Explain pulse width modulation and pulse position modulation in detail.

(2) Define digital modulation .classify types of digital modulation techniques. Explain amplitude shift keying (ASK) in detail.

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

(1) What is meant by synchronization in connection with digital transmission? State different levels of Synchronization.

(2) Explain quantization process with its types in pulse code modulation.

(3) Write note on Phase shift keying (PSK)

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

(1) Define network and frame t synchronization.

(2) Give disadvantages of pulse modulation.

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

(1) Explain ratio detector in detail. 7

(2) Show that input signal must be large and load resistance must be kept much larger than diode resistance when modulated voltage is applied as input to diode in diode detection.

(b) Attempt any **two** :

(1) What is PLL? State and explain two basic blocks of PLL. 8

(2) Give advantages and disadvantages of balanced slope detector.

(3) Write note on 'Op-AMP envelope detector'.

(c) Attempt any **one** :

(1) Define demodulation and demodulators (detectors). State different types of basic demodulators. 2

(2) Define efficiency of detection. On which factors it depends?

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

(1) What is thermal sensing system? Explain in detail. 8

(2) Explain different types of platforms.

(b) Attempt any **two** :

(1) Discuss in brief active remote sensing. 8

(2) Discuss the advantages of GIS.

(3) Discuss Atmospheric effects on Spectral Response Patterns.

(c) Attempt any **one** :

(1) Define atmospheric windows. 2

(2) What are the types of resolution?

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

(1) Discuss about Induction motor with principal, construction and advantages-disadvantage.

(2) What is converters? Explain about single phase dual converter.

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

(1) Give history of power electronics with example of power electronics device

(2) Discuss about DC servo motor.

(3) Write note on stepper motor.

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

(1) Draw the basic power processing block diagram.

(2) Direction of rotation of motor is determined by which low?

RH-960-961 Seat No._____

M. Sc. (Sem. III) Examination

November - 2023

Physics : MSPHY-301ES & MSPHY-302ES

(1) MSPHY-301ES : Research Methodology

(2) MSPHY-302ES : Microcontroller

Time : 2 Hours] [Total Marks : 35

(1) MSPHY-301ES : Research Methodology

Instructions : (1) Symbols have their usual meaning.
(2) Figures to the right side indicate marks of the question.

1 (a) Answer the following: (Any **one** out of two) 6

(1) What is research? Write and explain types of research in detail.

(2) Explain the review methods of reference in the research.

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

(1) Write a short note on citation.

(2) Write a short note on essential steps of scientific research.

(3) Write a short note on research paper writing.

2 (a) Answer the following: (Any **one** out of two) 6

(1) Explain the methods to prepare tables, charts and figures in research report writing

(2) Discuss the precautions taken in presenting the scientific data research report.

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

(1) Give the difference between field work and laboratory work.

(2) Write a short note on importance of Guide in research work.

(3) Write importance of observation table in field work research.

3 (a) Answer the following: (Any **three** out of five) 6

(1) What is invention?

(2) Where is INFLIBNET centre located?

(3) What is Review Process?

(4) Write full form of ISBN.

(5) Write short note on synopsis.

(b) Answer the following: (Any **five** out of eight) 5

(1) What is the relationship between ISBD and cataloguing codes?

(A) They are not related at all.

(B) Cataloguing codes will include bibliographic description.

(C) ISBD includes cataloguing rules.

(D) ISBD can replace cataloguing rules .

(2) The essential qualities of a researcher are

(A) Spirit of free enquiry

(B) Reliance on observation and evidence

(C) Systematization or theorizing of knowledge

(D) All of the above

(3) Action research means

(A) A longitudinal research

(B) An applied research

(C) A research initiated to solve an immediate problem

(D) A research with socioeconomic objective

(4) ____ is a preferred sampling method for the population with finite size.

(A) Systematic sampling

(B) Purposive sampling

(C) Cluster sampling

(D) Area sampling

(5) The data of research is ____

(A) Qualitative only

(B) Quantitative only

(C) Both (a) and (b)

(D) Neither (a) nor (b)

(6) Now a day's what is a most important vital resource for societal development of a country?

(A) Books

(B) Knowledge

(C) In formation

(D) Data

(7) What is the meaning of E-Documents?

(A) All Documents other thar printed

(B) Non-Paper documents

(C) In electronic form such as Cassettes, CD-ROMs, etc.

(D) Audio visual tools

(8) What is the meaning of 'Translation Pools'?

(A) Details about the names of translation experts

(B) Details about the addresses of the translators

(C) Agency of the names of translation experts

(D) None of these.

(2) MSPHY-302ES : Microcontroller

Instructions : (1) Symbols have their ususal meaning.

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

1 (a) Answer the following : (Any **One**) 6

(1) Write a note on Programming Model of 8051 Microcontroller.

(2) Draw DIP Pin Assignments of Microcontroller 8051

(b) Answer the following : (Any **Two**) 6

(1) Discuss STACK and the STACK POINTER.

(2) Explain Oscillator circuit in 8051.

(3) Explain various types of interrupt in 8051.

2 (a) Answer the following : (Any **One**) 6

(1) Write a note on of AVR Microcontroller 8051 block diagram.

(2) Explain AVR General Purpose Registers and ALU.

(b) Answer the following : (Any **Two**) 6

(1) Explain STS instruction (ST ore direct to data Space).

(2) Discuss AND, OR and EOR instructions in brief.

(3) Show how to represent decimal 99 in formats of (a) hex, (b) decimal, and (c) binary in the AVR assembler.

3 (a) Answer the following : (Any **Three**) 6

(1) What is Register ? State application of general purpose register.

(2) What does Program counter do ?

(3) Differentiate Microprocessor and Microcontroller.

(4) State four applications of Microcontroller.

(5) Write name of any four AVR chips.

(b) Answer the following : (Any **Five**) 5

(1) There are_____Ports in 8051. (2, 4, 6, 8)

(2) There are_____port pin any one port of 8051. (2, 4, 6, 8)

(3) What is Microcontroller ?

(4) What is full form of EPROM ?

(5) What is wrong with "STS OCRO, R23"?

(6) No value can be loaded directly into internal SRAM. (True or false)

(7) Write instructions to add 2 to the contents of R18.

(8) The ATmega32 has_____ pins for I/O.

RH-936

Seat No._____

M. Sc. (Sem. III) Examination

October - 2023

Botany : BOC - 301

(Diversity-III - Gymnosperms & Fossils)

(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 caring 18, 17, 18 and 17 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 : 18

A. Explain in Detail - any one. 8
(1) Geological rise and fall of gymnosperms.
(2) Comparison between angiosperms and gymnosperms.

B. Explain in Brief - any one. 7
(1) Evolution of gymnosperm.
(2) Economic importance of gymnosperms.

C. Give short answers - any three. 3
(1) Define: Gymnosperm.
(2) Phanerogams without the ovaries are _____.
(3) Endosperm in gymnosperm is _____.

(4) Ephedrine an alkaloid extracted from _____.

(5) _____ is the most advanced order in gymnosperms.

2 Answer the following as per instruction : 17

A. Explain in Detail - any one. 8

(1) Structure of female cone in Pinus.

(2) Structure of Cycas leaflet.

B. Explain in Brief - any one. 6

(1) Structure of female cone in Ephedra.

(2) Male cone in Cycas.

C. Give short answers - any three. 3

(1) Ginkgo biloba is considered a _____ fossil.

(2) A prokaryotic autotrophic nitrogen fixing symbiont is found in _____.

(3) _____ is the smallest gymnosperm.

(4) Winged pollen grains are found in _____.

(5) Female cone is absent in _____.

3 Answer the following as per instruction : 18

A. Explain in Detail - any one. 8

(1) Geological time scale.

(2) Factors affecting fossilization.

B. Explain in Brief -any one. 7

(1) Fossil work in India.

(2) The processes of plant fossilization.

C. Give short answers - any three. 3

(1) Palaeobotany is the study of _____.

(2) Define : Petrification.

(3) what is impression fossil ?

(4) Fossils are formed in which types of rocks?

(5) The father of "Indian paleobotanist" is _____.

4 Answer the following as per instruction : 17

A. Explain in Detail - any one. 8

(1) The internal structure of Rhynia stem.

(2) Reproductive organs of Bennettitales.

B. Explain in Brief any one. 6

(1) Internal structure of Lyginopteris stem.

(2) Lepidocarpon.

C. Give short answers - any three : 3

(1) Rhynia was discovered from red stone beds of _____.

(2) Stalked ovules are seen in _____.

(3) The pollen-bearing organs of Lyginopteris belong to _____.

(4) What is the scientific name of giant horsetail.

(5) Lepidodendrion belongs to family _____.

RH-937 Seat No._____

M. Sc. (Sem. III) Examination

October - 2023

Botany : BOC - 302

(Molecular Biology of Plants)

(New Course)

Time : $2\frac{1}{2}$ 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 net and labeled diagram if required.

1 (A) Answer the following question in brief : 8

(Any One)

(1) Transcription phenomena in eukaryotes

(2) Chemical structure of DNA

(B) Write short note (Any One) 7

(1) Enzymes involve in DNA replication

(2) Protein synthesis

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

(1) Draw a labeled diagram only: tRNA clover leaf model

(2) Z form DNA is a _____ handed: (Left or Right)

(3) ATP is a nucleotide (True or False)

(4) Uridine present in RNA is :

(A) Purine (B) Pyrimidine (C) Nucleoside

(5) Explain the word: Replication

[Contd...

2 (A) Answer the following question in brief : (Any One) 8

(1) Human Genome Project

(2) Regulation of gene expression in eukaryotes

(B) Write short note : (Any One) 6

(1) Application of proteomics

(2) Protein expression profiling

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

(1) The term transcriptomics refers to the study of :

(A) RNA molecules (B) DNA molecule (C) ATP molecule

(2) Explain the word: mass spectrometry.

(3) The repressor protein is encoded by regulatory gene. (True or False)

(4) Restriction enzymes belong to a larger class of enzymes called:

(A) Protein (B) Iso-enzyme (C) Nucleases

(5) Define: proteome

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

(1) Recombinant DNA technology

(2) Southern blot analysis

(B) Write short note : (Any One) 7

(1) cDNA library

(2) Plasmid as a vector

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

(1) What do you meant by bacteriophaser?

(2) Cutting and joining of the DNA are the techniques of:

(A) DNA-degradation

(B) DNA- Replication

(C) DNA- Manipulation

(3) Explain the term : gene cloning
(4) Define: Genome library
(5) Ampicillin antibiotic resistance is present in pBR322 vector: (True or False)

4 (A) Answer the following question in brief : (Any One) 8
(1) Polymerase Chain Reaction (PCR)
(2) DNA microarray

(B) Write short note : (Any One) 6
(1) AFLP - DNA fingerprinting
(2) DNA synthesis.

(C) Answer the following question in very short : (Any three) 3
(1) Mention the applications of DNA sequencing
(2) Thermus aquaticus is the source of:
(A) Primase enzyme
(B) Vent polymerase
(C) Taq polymerase
(3) Depurination denatures the RNA fragments. (True or False)
(4) Write the full form of: RFLP
(5) The technique used to analyze gene expression on a large scale is called :
(A) Fingerprinting
(B) Electrophoresis
(C) Microarray

RH-938 Seat No. _____

M. Sc. (Sem. III) Examination

November - 2023

Botany : BOC-303

(Plant Ecology) (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 caring 18, 17, 18 and 17 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 (a) Answer in detail : (attempt any **one**) **8**

(1) Describe types of climatic regions of India on the basis of annual precipitation.

(2) What is a Niche? Discuss Hypervolume niche with examples.

(b) Answer in brief : (attempt any **one**) **7**

(1) Distinguish between: Primary and secondary succession and explain reaction in succession.

(2) Write note on: Fidelity and dominance.

(c) Answer in very short : (any **three**) 3

(1) Why red colour of soil is observed?

(2) Define : Phenograms.

(3) Give two community characters which are affected by number of individuals in community.

(4) Pollination is which type of Interspecific communication?

(5) Name the plants which are present during Sedge-Medow stage of Hydrosere.

2 (a) Answer in detail : (attempt any **one**) 8

(1) Explain the effect of Light and Temperature on Distribution of Plants.

(2) Explain the pathways and processes involved in biogeochemical cycles of carbon (C) and their ecological importance.

(b) Answer in brief : (attempt any **one**) 6

(1) Briefly describe the Abiotic & Biotic Components of Ecosystem.

(2) Explain the Y shaped or 2 channel Energy Flow model.

(c) Answer in very short : (any **three**) 3

(1) Explain the difference between gross primary productivity (GPP) and net primary productivity (NPP).

(2) What is the primary source of energy in most ecosystems?

(3) Give Example of Some Nitrogen Fixing Bacteria.

(4) Give sub-types of Freshwater ecosystem.

(5) Which Ecological pyramid is always in Up-Right position?

3 (a) Answer in detail : (attempt any **one**) 8

(1) Explain the concept of speciation and extinction in the context of biodiversity.

(2) Describe the IUCN categories of threat used to assess the conservation status of species.

(b) Answer in brief : (attempt any **one**) 7

(1) Write short note: Terrestrial biodiversity hotspots of India.

(2) Explain the different types and sources of air pollution.

(c) Answer in very short : (any **three**) 3

(1) What criteria does the IUCN use to evaluate the conservation status of species?

(2) What is γ (Gamma) Diversity?

(3) What is difference between BOD and COD?

(4) Which type is a special case of allopatric speciation where a small, isolated population (usually at the edge of a larger population) undergoes rapid evolutionary changes and eventually becomes a new species?

(5) Which type of pollution can be cured by Phytoremediation technique?

4 (a) Answer in detail ; (attempt any **one**) 8

(1) What is 'Green House Effect'? Explain its Source, Mechanism and Harmful effect on Global Environment.

(2) Explain how invasive plant species can disrupt native ecosystems and the strategies that can be employed for their management and control.

(b) Answer in brief : (attempt any **one**) 6

(1) What is Sustainable Development? Explain its Concept, Principles and Threats to it.

(2) Describe the Mechanism and Consequences of Destruction of Ozon layer.

(c) Answer in very short : (any **three**) 3

(1) Select the 'Green House Gases' from-the given list: CO_2, N_2, CH_4, N_2O, O_2, CFCs, Ar, H_2O vapour.

(2) What is the potential consequence of sea level rise due to climate change?

(3) At which Atmospheric level Ozon layer is present? And What is its approximate height?

(4) List Two Major Consequences of UV radiation.

(5) What is Anthropogenic Ecological Perturbations?

RH-939 Seat No. _____

M. Sc. (Sem. III) Examination

November - 2023

Botany : BOC-304

(Plant Physiology) (New Course)

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

Instructions : (1) This question paper consists tctal 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 providec in each sub-questions.

(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) Metabolic changes associated with senescence.

(2) Physiological aspects of seed germination.

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

(1) Factors affecting seed germination.

(2) Seed dormancy : types and causes.

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

(1) Which hormone is responsible for seed germination?

(2) Role of cotyledons.

(3) Ethylene is responsible for Seed dormancy. - Is it true?

(4) Give the full name of ABA.

(5) What is apoptosis?

2 Answer the following as per instruction : 17

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

(1) Biological nitrogen fixation.

(2) Zink (Zn): mechanism of absorption, regulation and transport.

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

(1) Water transport through xylem.

(2) Phloem loading and unloading.

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

(1) What is active transport?

(2) Role of companion cell.

(3) Deficiency symptoms of Fe in plants.

(4) What is biotic stress?

(5) Effects of peroxides.

3 Answer the following as per instruction - 18

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

(1) C-3 cycle.

(2) Light harvesting complexes.

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

(1) Phytochromes.

(2) Glycolysis.

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

(1) Give the full name of CAM pathway.

(2) What is photo oxidation?

(3) Sugarcane having C-3/C-4 cycle.

(4) What is photophosphorylation?

(5) Give the full name of TCA cycle.

4 Answer the following as per instruction : 17

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

(1) Auxins: structure, physiological effects and mechanism of action.

(2) Photoperiodism.

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

(1) Vernalization.

(2) Abscission acid: structure, physiological effects and mechanism of action.

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

(1) Role of florigen.

(2) Which is synthetic auxin?

(3) What is elicitors?

(4) Polyamines are found in _____ plant.

(5) Typical flower having _____ cycles of floral parts.

RH-924 Seat No. _____

M. Sc. (Sem. III) Examination

November - 2023

Organic Chemistry : CHNN-604(O)

(New Course)

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

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

(a) Discuss nomenclature and classification of Heterocyclic compound.

(b) Write note on synthesis and chemical reactivity of imidazole.

(c) Give synthesis of Oxazole and Thiazole.

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

(a) Give skraup synthesis for Quinolone.

(b) Give reaction and synthesis of Bicyclic Heterocyclic compounds of Isoquinoline.

(c) Discuss electrophillic substitutions of substituted Quinoline and Isoquinoline.

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

(a) Write application of Oxidation Reagent : $Na_2Cr_2O_7$.

(b) Write a note on oxidizing reagent : CF_3COOH.

(c) Synthesis and uses of alluminium iso-propoxide with mechanism.

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

(a) Give application of Diisobutyl alluminium hydride with preparation.

(b) Synthesis and uses of sodium cyano brohydride.

(c) Write a note on applications of $NaBH_4$ on aldehyde, ketone and ozonides.

RH-940-941-942 Seat No._____

M. Sc. (Sem. III) Examination

November – 2023

Botany

(1) BOE301 : Air Pollution & Climate Change (New Course)

(2) BOE302 : Herbal Medicine (New Course)

(3) BOE303 : Biostatistics (New Course)

Time : Hours] [Total Marks : 35

BOE301 : Air Pollution & Climate Change (New Course)

Instructions :
(1) The question paper consists total three 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 (a) Describe : (Any **One**) **8**

(i) Matabolism, toxicity, resistance and effects of Sulphur derivatives.

(ii) Discuss formation, general effects and defence against of SMOG

(b) Do as directed : (Any **One**) 6

(i) Write note on : Composition of Troposphere.

(ii) Define and discuss : Indoor air pollution.

2 (a) Explain : (Any **One**) 8

(i) Action and effects of UV-Bon different organisms.

(ii) Effect of increased Carbon and its sequestration.

(b) Write note on : (Any **One**) 6

(i) How Acid rain forms? Discuss its effects on Soil and Forest.

(ii) Active and Passive Bio-monitoring.

3 Objective questions : (Answer any **Seven**) 7

(1) In which layer of atmosphere an Ozone layer is found ?

(2) Name any two sulphur derivatives.

(3) How nitrogen derivatives affect historical mounemnets ?

(4) What is Biological magnification ?

(5) Which pollutant causes arthritis and dental problems ?

(6) What is the role of water vapour in Greenhouse effect ?

(7) Is Greenhouse effect important for life ? How?

(8) Name any two Bio-indicater plants.

(9) Name two gases responsible for Ozone depletion.

(10) Role of phytoplankton in Carbon management.

(2) BOE302: Herbal Medicine (New Course)

Instructions : (1) The question paper consists total three 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 (a) Answer following Long answer question 8

(One out of two)

(i) Describe functions of Secondary metabolites.

(ii) Describe bioactive molecules and therapeutic value of Giloy, Safed musli, Kalmegh and Ashwagandha.

(b) Answer following medium answer question 6

(One out of two)

(i) Write a note on pathway of biosynthesis of phenols and Terpenoids.

(ii) Write a note on types of secondary metabolies.

2 (a) Answer following Long answer question 8

(One out of two)

(i) Describe multiplication of medicinal plants.

(ii) Discuss importance of traditional medicinal knowledge.

(b) Answer following medium answer question **(One out of two)** 6

(i) Write a note on conservation of Medicinal plants.

(ii) Write a note on standardization of herbal drugs.

3 Very short answer : (**Seven** of Ten) 7

(i) Give any two examples of Alkaloids.

(ii) What is terpene ?

(iii) Write botanical name and bioactive molecules of Bel and Amla.

(iv) Write botanical name, family and bioactive molecules of Brhami.

(v) Write botanical name, family and bioactive molecules of Aloe.

(vi) What is nutraceuticals?

(vii) Give two examples of two medicinal foods.

(viii) What is biopiracy ?

(ix) Give names of two conservation methods of medicinal plants.

(x) Write two examples of nutraceuticals.

(3) BOE303: Biostatistics (New Course)

Instructions : (1) The question paper consists total three 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...

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

(1) Normal distribution.

(2) Write the sampling method.

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

(1) Chi-Square test.

(2) T-test.

2 Answer the following as per Instruction...

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

(1) Types of correlation.

(2) Analysis of variance.

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

(1) Regression.

(2) Basics of environmental modelling.

3 Give short answers : (any **seven**) 7

(1) Write the formula of Chi-square.

(2) Define : Sampling.

(3) Give the full form of ANOVA.

(4) What is correlation ?

(5) Write the scope of parametric statistics. (any **two**)

(6) How is the degree of freedom calculated ?

(7) To calculate the median, all the items of a series have to be arranged in a/an_____.

(8) The sum of deviations from the_____ is always zero.

(9) If the value of two variables move in the same direction_____.

(10) _____strategies helps provide the prediction mechanism by anslysing the relationship between two variables.