



RV-572

Seat No.

M. Sc. (Sem.-IV) Examination

March - 2024

Organic Chemistry : CHNN-701(O)

Time : 2:30 Hours]

[Total Marks : 70

Instruction : All questions are compulsory.

1 Answer any two of the following : 17

- (1) Evidence for nature of sugar ring and its linkage in pyrimidine nucleoside.
- (2) Discuss the attachment of sugar to base in purine nucleoside.
- (3) Write a synthesis of thiamine and uric acid.

2 Answer any two of the following : 18

- (1) Discuss the chemical relation between starch and cellulose.
- (2) Write a note on deoxy sugar and amino sugar.
- (3) Explain photosynthesis of carbohydrate.

3 Answer any two of the following : 17

- (1) Give evidence and position of methyl group and aromatic rings in Oestrone.
- (2) Give evidence for the position and nature of side chain in Ergosterol.
- (3) Give the synthesis of progesterone from diosgenin.

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[Contd..

- 4 Answer any two of the following : 18
- (1) Discuss the conformational analysis of Perhydro Anthracene.
 - (2) Describe stereochemistry of bicyclo[2.2.2] Octane and bicyclo[2.1.1] hexane.
 - (3) Discuss the conformation of benzene hexachloride with stability order.



RV-575

Seat No. _____

M. Sc. (Sem.-IV) Examination

March - 2024

CHNN-702(O) : Industrial Organic Chemistry

Time : $2\frac{1}{2}$ Hours

[Total Marks : 70]

1 Answer any two of the following :

- (1) How ethylene is obtained on a large scale in industries ? Give the manufacture of industrially important chemicals from ethylene.
- (2) Explain aromatic hydrocarbons chemicals from Naphta.
- (3) Give difference between natural and synthetic fibers and detail account on manufacture of polyamide fibers.

2 Answer any Two :

- (1) Give Classification of paints and reason for paint failure.
- (2) Discuss the manufacturer of varnishes and types of varnishes.
- (3) Write a note on toxic chemicals and give synthesis of TETRYL and PENTRYL.

3 Answer any two :

- (1) What is polyethylene polymer ? Write on LDPE and HDPE polymer with their uses.
- (2) Classify resin and discuss its application.
- (3) What is acrylic polymer ? Discuss any two acrylic polymers.

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[Contd...

- Answer any two :
- (1) Discuss the small scale manufacture of writing ink and shoe polish.
 - (2) Discuss the small scale manufacturer of safety matches and naphthalene balls.
 - (3) Give the steps and tips for stain remover and discuss the anionic surfactants in detergents.



RV-579

M. Sc. (Sem.-IV) Examination
Seat No. _____

March - 2024

Organic Chemistry : CHNN-703(O)

(Synthetic Drugs)

Time : $2\frac{1}{2}$ Hours

Total Marks : 70

18

I Answer any Two of the following :

- (1) What are Antimalarials ? Classify the antimalarial drugs on the basis of chemotherapy. Give the synthesis and physiological activity of Daraprim and Penicillamine phosphate.
- (2) Give the classification and give the synthesis of any three drug of anti cancer drugs.
- (3) Write a note on :
 - (i) Antiamoebic drugs
 - (ii) Anti Viral drugs.

17

2 Answer any two of the following :

- (1) Write a note on :
 - (i) Hallucinogenic drugs
 - (ii) Antianxiety
- (2) What are sedative & hypnotics ? Explain the relationship between their chemical structure and sleep promoting activity. What is sleep cycle ?
- (3) Write a note on :
 - (i) Antidepressant
 - (ii) Anticonvulsants

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[Contd...

- 4 Answer any two of the following :
- (1) What is diabetes ? Mention its types. Write synthesis of any one oral hypoglycemic agent.
 - (2) Write a note on Anti leprotic drugs and give synthesis of thionamide.
 - (3) Write a note on :
 (i) Anti tubercular drugs
 (ii) Anti Fungal drugs
- 3 Answer any two of the following :
- (1) Name the different drugs acting on Renal system with their mode of action.
 - (2) Write a note on Di-uretics.
 - (3) Explain β -Adrenergic blocking agents and cardiovascular diseases. Give synthesis of any two cardiac drugs.
- 17
- 18



RV-582

Seat No. _____

M. Sc. (Chemistry) (Sem.-IV) Examination

March - 2024

CHNN-704 : Organic Chemistry : Paper - IV

(Selected Topic in Organic Chemistry)

(New Course)

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

1 Answer any two of the following questions : 18

(1) Explain the Baeyer-Villiger reaction with application

(2) Explain the principle, mechanism and application of Curtius rearrangement.

(3) What is Wagner-Meerwein rearrangement? Discuss the principle features of Wagner-Meerwein rearrangement.

2 Answer any two of the following questions : 17

(1) Explain the principle, mechanism and application of Stevens rearrangement.

(2) Discuss the mechanism and application of Fries rearrangement.

(3) Explain the principle, mechanism and application of Benzidine rearrangement.

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[Contd...

- 4 Answer any two of the following questions : 17
- (1) Discuss the principle, mechanism and application of Cannizzaro reaction.
 - (2) Explain the principle, mechanism and application of Reimer-Tiemann reaction.
 - (3) Write a short note on Dieckmann reaction.
- 3 Answer any two of the following questions : 18
- (1) Explain the preparation and application of organolithium compounds.
 - (2) Write a note on organosilicon compounds.
 - (3) Short note on preparation of organocadmium compounds.



RV-586-587

Seat No _____

M. Sc. (Sem.-IV) Examination

March - 2024

Organic Chemistry : CHNN-705

(1) Disconnection Approach

(New Course) (Elective)

(2) Organic Chemical Toxicity &

Solid Waste Management

(New Course) (Subject Elective)

Time : 2 Hours]

[Total Marks : 35

(1) Disconnection Approach

(New Course) (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 :

(1) Explain reversal of polarity and two group C - X

disconnection with suitable illustrations.

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Contd...

17

- 2
- Answer any two of the following :
- (1) Write a note on :
- Sharpless epoxidation reaction
 - Robinson annulation
- (2) What is protecting group? Describe the protection of carbonyl group with suitable examples.
- (3) Discuss the use of Heck reaction and Suzuki reaction in organic synthesis.
- 18
- (2) Define the following terms with appropriate examples.
- Functional group inter conversion
 - Synthon
 - Synthetic equivalents
- (3) Discuss the importance of the order of events in organic synthesis with suitable example.

**(2) Organic Chemical Toxicity &
Solid Waste Management**
(New Course) (Subject Elective)

1 Answer any two of the following : 18

- (1) What is chemical toxicology ? Explain the biochemical effects of Cadmium and Lead.
- (2) Explain biological methylation and its effects.
- (3) What is PAN ? Explain about biochemical effects of PAN and cyanides.

2 Answer any two of following : 17

- (1) How can we solve the problem of municipal solid waste? Explain in detail.
- (2) Explain the solid waste management by biotechnology.
- (3) What is composting? Explain about Vermi composting.

**(2) Organic Chemical Toxicity &
Solid Waste Management**

(New Course) (Subject Elective)

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- (1) What is chemical toxicology ? Explain the biochemical effects of Cadmium and Lead.
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2 Answer any two of following : 17

- (1) How can we solve the problem of municipal solid waste? Explain in detail.
- (2) Explain the solid waste management by biotechnology.
- (3) What is composting? Explain about Vermicomposting.



RV-591

Seat No. _____

M. Sc. (Sem. IV) Examination

March - 2024

BOC-401 : Botany

(Plant Biotechnology)

(New Course)

Time : 2 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 necessary

diagrams, if required.

18 (A) Describe in detail : (one out of two) each of

8 marks.

(1) Vector-less or direct DNA transfer.

(2) Social and ethical issues.

(B) Write short note on : (one out of two) each of

7 marks:

(1) Basic principles and scope of biotechnology.

(2) *Agrobacterium* or vector mediated gene

transfer.

(C) Answer in short : (Three out of five) each of

1 mark.

(1) Explain the word : r-DNA.

(2) The study of ethical, social and legal issues that arise in biomedical research is called :

(a) Biopiracy

(b) Biohistic

(c) Bioethics

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[Contd...

- 3 (A) Describe in detail : (one out of two) each of 18 marks :
- (1) Transgenic plants for crop improvement
 - (2) Different types of culture
- (A) Describe in detail : (one out of two) each of 18 marks :
- (1) Explain the word : Molecular marker
 - (2) Excision and insertion of a gene is called :
 - (a) Biotechnology
 - (b) Genetic engineering
 - (c) Gene therapy
 - (3) Mention the family of *Arabidopsis* plant
 - (4) A field of biology focused on studying all the DNA of an organism is called proteomic (True or False)
 - (5) What do you mean by polymer ?
- (B) Write short note on : (one out of two) each of 6 marks.
- (1) Fermentation technology.
 - (2) Microbes and nitrogen fixers.
- (A) Describe in detail : (one out of two) each of 17 marks :
- (1) Production of antibodies and vaccines
 - (2) Molecular farming.
- (A) Describe in detail : (one out of two) each of 17 marks :
- (3) Mention the basic concept of biotechnology.
 - (4) The DNA fragments have sticky ends due to unpaired bases. (True or False)
 - (5) Hairy root disease is caused by *Agrobacterium*.

- (B) Write short note on : (one out of two); each of 7 marks.
- (1) Cryopreservation
 - (2) Hybridoma technology
- (C) Answer in short : (three out of five) each of 1 mark.
- (1) Give the full form of cpDNA
 - (2) The most common solidifying agent used in micropropagation is:
 - (a) Mantol
 - (b) Dextran
 - (c) Agar
 - (3) State the scientific name of "rice".
 - (4) Synthetic seeds are also called artificial seeds. (True or false)
 - (5) Define : Clonal propagation.
- (A) Describe in detail : (one out of two) : each of 8 marks.
- (1) Genetic modify organisms (GMO) crops
 - (2) Roll of biotechnology in food nutrition and health.
- (B) Write short note on : (One out of two) : each of 6 marks.
- (1) Applications of biotechnology
 - (2) Biotechnological products

- (C) Answer in short : (three out of five) each of 1 mark
- (1) Explain in very short : Herbal medicine.
 - (2) The ability to maintain a process continuously over time is called:
 - (a) Viability
 - (b) Sustainability
 - (c) Probability
 - (3) What do you mean by traditional knowledge?
 - (4) Increasing, using and cycling are way of waste management. (True or False)
 - (5) Define : Social responsibility.



RV-592

Seat No. _____

M. Sc. (Sem.-IV) Examination

March - 2024

Botany : BOC-402

(*Ethnobotany, Mushrooms & Mycorrhizae*)

(*New Course*)

Time : $2\frac{1}{2}$ Hours

[Total Marks : 70]

Instructions :

- (1) The question paper consists four questions, each has three sub-questions A, B and C.
- (2) All questions are compulsory. In each section 1st and 3rd questions carry 18 marks and 2nd and 4th carry 17 marks.
- (3) There is no overall choice. However, an internal choice has been provided in each sub-question.
- (4) Write the answer of each question in separate answer sheet.
- (5) Illustrate your answers with necessary diagrams, if required.

1 Answer the following : 18

- (A) Long answer question: (one out of two) each of 8 marks.
- (1) Ethno-medical practices on *Gliricidia* and *Tribulus*.
- (2) Various sub-disciplines of ethnobotany.

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1 Contd..

- 2 Answer the following :
- (A) Long answer question : (one out of two) each of 8 marks.
- (1) *Artemisia* as a powerful cerebral antimalarial agent.
 - (2) Medico-ethnobotanical sources in India.
- (B) Short answer question : (one out of two) each of 6 marks.
- (1) *Withania* is a known drugs as antioxidant and relaxant.
 - (2) Fieldwork exercise of ethnobotany.

- 3 Answer the following :
- (A) Long answer question : (one out of two) each of 7 marks.
- (1) Medico-ethnobotanical survey and their role in Ayurveda.
 - (2) Tribal and their lifestyle.
- (B) Short answer question : (three out of five) 3 marks.
- (1) The term ethnobotany was first coined by _____ in Susut
 - (2) Namanjana word is used for _____ in Sambra :
- (a) Physiology
 - (b) Nomenclature
 - (c) Morphology
- (3) Write the name of family : *Indigofera tinctoria*
- (4) Which of the following is the primitive hill cultivation tribe of India ?
- (a) Kathroi
 - (b) Rabari
 - (c) Bhil
- (5) Sacred groves are tracts of forest which regenerated around places of worship. (True or False)

- 3 Answer the following :
- (A) Long answer question : (one out of two) each of 8 marks.
- (1) Medicinal and nutrition value of mushroom.
(2) Paddy straw mushroom.
(B) Short answer question : (one out of two) : each of 7 marks
- (1) Method of cultivation of *Agaricus bisporus*.
(2) Biological significance of mushroom.
(C) Do as directed : (three out of five) 3 marks.
- (1) Explain the word : spawn.
(2) Mushrooms are excellent source of :
(a) Protein
(b) Vitamin
(c) Carbohydrate

18

- (A) Long answer question : (one out of two) each of 8 marks.
- (1) Medicinal and nutrition value of mushroom.
(2) Paddy straw mushroom.
(B) Short answer question : (one out of two) : each of 7 marks
- (1) Method of cultivation of *Agaricus bisporus*.
(2) Biological significance of mushroom.
(C) Do as directed : (Three out of five) 3 marks.
- (1) Write the name of family : *Cenilia*
(2) Charak and Sushru Samhita are old literature.
- (a) Indian
(b) Arabian
(c) Imani
- (3) Explain the word : archaeological finding.
(4) Which method is most significance in all ethnobotanical studies ?
(a) Inventory-investment
(b) Inventory-submission
(c) Inventory-interview
- (5) Ethnobotany provides spiritual and holistic uses of the plants. (True or False)

- (3) Write the name of poisonous mushroom (any one)
- (4) Following which is the scientific name of Truffle Mushroom?
- (a) *Morchella esculenta*
 (b) *Tuber melanosporum*
 (c) *Pleurotus ostreatus*
 (5) The *Amanita* mushroom is poisonous and deadliest. (True or False)
- 4 Answer the following :
- (A) Long answer question : (one out of two) each of 8 marks.
- (1) Vesicular Arbuscular Mycorrhizal fungi.
 (2) Outline of any one method : isolation of mycorrhizae.
- (B) Short answer question : (one out of two) each of 6 marks.
- (1) Role of mycorrhizae in crop productivity.
 (2) Orchid mycorrhizae
- (C) Do as directed : (three out of five) 3 marks.
- (1) Write the full form of PSF
 (2) Mycorrhizae is associated with the following
- (a) Formation of Legume
 (b) Hyphae penetrating the soil
 (c) Formation of root nodules
- (3) Explain the word : wood wide Web
 (4) Symbiotic association between roots of higher plants and fungi called:
 (a) Mycoplasma (b) Mycodeerma (c) Mycorrhizae
- (5) Mycorrhiza cannot be used as biofertilizer. (True or False)



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Seat No. _____

M. Sc. (Sem.-IV) Examination

March - 2024

Botany : BOC-403

(Plant Resources Utilization & Conservation)

(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) Adulteration in cereals and pulses.
- (2) Origin, evolution, cultivation and uses of potato.

(b) Explain in brief - any one 7

- (1) Silk cotton as stuffing fibre.
- (2) Guarthan as fodder crop.

(c) Give short answers - any three : 3

- (1) Which oil is as adulterant in sunflower oil?
- (2) What is the scientific name of Jute ?
- (3) Give the name of family of Coir
- (4) Clove is the _____ organ of plant
- (5) Chicken pea is _____ (food / fodder / pulses)

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- 3 Answer the following as per instruction :
- Explain in detail - any one:
 - Give the brief account of Mangroves.
 - Explain in brief : (any one)
 - Wild life sanctuaries of Gujarat
 - Biosphere reserves
 - Give short answers - any three :
 - Give any one name of National Park of Madhya Pradesh.
 - Role of wetlands in Biodiversity.
 - What is *in situ* conservation ?
 - Give the name of National park of Lions.
 - What is coral reefs ?
- 18
8
7
3
- 2 Answer the following as per instruction :
- Explain in detail - any one :
 - Indigo as plant dye.
 - Explain in brief - any one:
 - Adhatoda* as medicinal plant.
 - Tectona* as timber yielding plant.
 - Give short answers - any three :
 - Flowers of *Butea* are used as _____
 - Give the scientific name of Garlic.
 - Any one use of synthetic rubber.
 - Catharanthus* is used as _____
 - Which chemical content is present in *Lawsonia* as plant dye ?
- 17
8
6
3

- 4 Answer the following as per instruction :
- (a) Explain in detail - any one
- (1) Give the general account and activities of ICAR
- (2) Seed banks
- (b) Explain in brief - any one :
- (1) Write the conservation efforts of DBI
- (2) Botanical gardens of Gujarat
- (c) Give short answers - any three :
- (1) Write the full form of NBPGR.
- (2) Which is the largest Botanical garden in India?
- (3) Write any one role of BSI in conservation.
- (4) What is *ex situ* conservation?
- (5) Gene banks are _____ conservation strategy
(*in situ / ex situ*)
- 17
- 8
- 6
- 3



RV-594

Seat No. _____

M. Sc. (Sem.-IV) Examination

March - 2024

Botany : BOC-404

(Horticulture & Plant Breeding)

(New Course)

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

1 (a) Answer the following - Long answer questions: 8

(one out of two)

(1) Write note on nature and scope of

horticulture

(2) Describe the nutra-cutical properties of

horticultural crops.

(b) Answer the following - short notes : (one out 7

of two)

(1) Give the various branches of horticultural

crops.

(2) Explain climatic zone of Gujarat in relation

to horticulture.

(c) Answer the following - short questions (three 3

out of five)

(1) What is Pomology?

(2) Name two horticultural-crops of South Gujarat.

(3) What is Horticulture?

(4) Give the food value of Mango.

(5) Write the medicinal value of Lemon.

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[Contd...

- 2 (a) Answer the following - Long answer question: 8
 (one out of two)
 (1) Describe the physiological aspects of seed germination.
 (2) Write note on environmental factor affecting horticulture crops.
 (b) Answer the following - short notes : (one out of two) 6
 (1) Write notes on extension of self life of flowers and fruits.
 (2) Describe the role of growth regulators in controlling seed and bud dormancy.
 3
 (c) Answer the following - short questions (Three out of five) 3
 (1) What is Parthenocarpy?
 (2) Give the example of two tuber forming plants.
 (3) What is pre-germination treatment?
 (4) Name the two fruit ripening hormones.
 (5) What is seed viability?
 8
 3 (a) Answer the following - Long answer question: (one out of two) 8
 (1) Explain briefly the objectives and applications of plant breeding.
 (2) Describe the Pedigree methods of plant breeding.
 (b) Answer the following - short notes : (one out of two) 7
 (1) Write difference between pure line selection and mass selection.
 (2) Write short note on Synthetic and Hybrid varieties.

- (c) Answer the following - short question : (Three out of five) 3
- (1) Give the name of two hybrid varieties of crops.
 - (2) Name one self pollinated crop.
 - (3) Give the merit of cross pollinated crop.
 - (4) What is backcross method ?
 - (5) What is recurrent selection ?
- 4 (a) Answer the following - Long answer question: 8
- (1) Write note on the types of Hybridization.
 - (2) Describe the role of polyploidy in Plant Breeding.
- (b) Answer the following : Short notes: 6
- (one out of two)
- (1) Write notes on Intellectual Property Rights (IPR).
 - (2) Give the Basic of Genetically modified plants.
- (c) Answer the following - Objective type questions: 3
- (three out of five)
- (1) Define emasculation.
 - (2) Define Hybrid vigour
 - (3) What is bagging and tagging?
 - (4) What is Biosafety?
 - (5) What is Patent?



RV-595-596-597 Seat No.

M. Sc. (Sem.-IV) Examination

March - 2024

Botany

(1) BOE-401 : Bioinstrumentation

(New Course)

(2) BOE-402 : Conservation & Restoration Ecology

(New Course)

(3) BOE-403 : Photobiology, Molecular Microbiology

& Synthetic Biology

(New Course)

Time : 2:30 Hours]

[Total Marks : 35

(1) BOE-401 : Bioinstrumentation

Instructions :

- (1) This question paper consist total three questions.
- (2) All questions are compulsory and carrying 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 :

- (a) Long answer questions : (one out of two) (each of 8 marks)
- (1) Applications of cytophotometry.
- (2) Fluorescence Microscopy.

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- (a) Charge
(c) Shape
(b) Size

- (10) In SDS-PAGE, migration of protein is effected by _____ of protein.
 (9) using electric field. (True or false)
 (8) Hydrolysis technique separates charge particles
 (7) Explain in short ; instrumentation
 (6) Mention the full form of : HPTLC
 (5) State the principle of chromatography.
 (a) Morphology
 (c) Ecology
 (b) Histology
 (4) What is the study of microscopic called ?
 (3) naked dye _____ (true or false)
 (2) Microorganisms that are too small to be seen by
 (1) Microscope is an essential tool to see
 (0) Who is the father of microscope ?
 (2) Mention the full form of : SEM.
 (1) State the principle of flow cytometry.
 Do as directed : (seven out of ten) each of 1 mark
 Answer the following :

- (2) Ion-exchange and affinity of chromatography.
 (1) Capillary electrophoresis and its applications.
 of 6 marks
 (b) Medium answer question : (One out of two) each
 (2) Agarose gel electrophoresis.
 (1) Applications of ultracentrifugation.
 8 marks.
 (a) Long answer question : (one out of two) each of

14

- 2 Answer the following :
 (2) Phase contrast microscope.
 (1) Applications of bright field microscopy.
 (each of 06 marks)
 (b) Medium answer question : (one out of two)

(2) BOE-402 : Conservation & Restoration Ecology

Instructions :

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

1	(a) Describe : (any one)	8
	(1) Principles of conservation ecology.	
	(2) Genetic variation and its loss.	
6	(b) Write short note : (any one)	
	(1) Theory of reserve design.	
	(2) Population viability analysis.	
2	(a) Describe : (any one)	8
	(1) Restoration of natural ecosystem.	
	(2) General principles of management.	
6	(b) Write short note : (any one)	
	(1) Concepts of restoration.	
	(2) Major tools used in restoration	
3	Answer the following questions in short : (any seven)	7
	(1) Define : conservation.	
	(2) What is a postulate?	
	(3) What is natural population?	
	(4) What is prioritizing species?	
	(5) Define : Protected area.	
	(6) Define : Restoration ecology.	
	(7) What is the impact of conservation restoration?	
	(8) What are the benefits of restoration?	
	(9) What is conservation strategies?	
	(10) State any one aim of restoration ecology.	

(3) BOE-403 : Photobiology, Molecular Microbiology
& Synthetic Biology

- 1 (a) Attempt any one out of two : 8
- (1) Explain - Cyanobacterial toxin
 - (2) Write a note on molecular mechanism of photodamage and photoprotection
- (b) Attempt any one out of two : 6
- (1) Ecological significance of CCA.
 - (2) Write a note on inorganic carbon uptake system.
- 2 (a) Attempt any one out of two : 8
- (1) Write a note on biofuels as renewable energy source.
 - (2) Genetic modification of Cyanobacteria.
- (b) Attempt any one out of two : 6
- (1) Bioethanol production.
 - (2) Explain clonal selection theory.
- 3 Attempt any seven out of ten : 7
- (1) Give full name of CCA.
 - (2) Define Immunoprecipitation.
 - (3) Give full name of CCM.
 - (4) Write a function of epitope.
 - (5) Give full name of MAA.
 - (6) Which bond connects the two identical chain of antibody ?
 - (7) Give full name of MHC.
 - (8) What are the first biofuels ?
 - (9) Define photolysase.
 - (10) What is the genetic material in Cyanobacteria?



RV-601

Seat No. _____

M. Sc. (Sem. IV) Examination

March - 2024

MSPHY401CC : Nuclear Physics-2 & Biophysics

(New Course)

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

Instructions : (1) Symbols have their usual meaning.
(2) All questions are compulsory.

1 (a) Attempt any one : 8

(1) Discuss analysis of shell model and its predictions.

(2) What is collective nuclear model? Explain.

(b) Attempt any two : 8

(1) Explain an electric quadrupole moment.

(2) For two particles and for l odd show that

$$\psi_f(r, \hat{\sigma}) = 0$$

(3) Nuclear shell model support the nuclear magnetic moment. How? Explain.

(c) Attempt any one : 2

(1) State the magic numbers in shell model.

(2) What is the difference between degenerate and non-degenerate nuclear state?

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- 2 (a) Attempt any one :
 (1) Discuss Laptions and their properties.
 (2) Discuss quarks elementary particle model and its hypothesis.
 7
- (b) Attempt any two :
 (1) Discuss types of Nuclear Interaction.
 (2) Explain neutral K-meson, strangeness and hypercharge.
 (3) Explain Gell-Mann okubo mass formula.
 8
- (c) Attempt any one:
 (1) Define nuclear isospin.
 (2) Give the example of strange particles.
 2
- 3 (a) Attempt any one :
 (1) Discuss Thin layer chromatography.
 (2) Explain Electrophoresis.
 8
- (b) Attempt any two :
 (1) Explain gas Liquid Chromatography (GLC)
 (2) Explain Adsorption chromatography.
 (3) Discuss High voltage electrophoresis.
 8
- (c) Attempt any one ::
 (1) Give the example of chromatography or use of chromatography.
 (2) Give the use of electrophoresis.
 2

- 4 Attempt any one: (a) (1) Discuss the nervous system.
(2) Biomechanics of striated muscles and contractile proteins. Explain. 7
- (b) Attempt any two : (1) Discuss optical defects of the eye and neural aspects of vision.
(2) Explain Blood Pressure and electrical activity during the heart beat.
(3) Explain bioluminescence. 8
- (c) Attempt any one : (1) Define Nerve system.
(2) What is acoustics of Ear ? 2



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Seat No. _____

M. Sc. (Sem.-IV) Examination

March - 2024

Physics : MSPHY-402CC

(Classical Mechanics2 & Electrodynamics2)

(New Course)

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

Instructions :

- (1) Symbol have their usual meaning.
(2) Figure to the right indicate marks of the question.

1 (a) Answer the following : (any one) 8

(1) Describe Limit cycle and attractor.

(2) Obtain rule for Poincare the points of stable

and unstable equilibrium.

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

(1) What is Chaos ? Explain it.

(2) Explain nonlinear oscillations.

(3) Explain Logistic map and write down

mathematical properties of logistic map.

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

(1) Define singular points.

(2) What is box counting dimension ?

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

(1) Explain proper time and proper velocity.

(2) Derive the equation of force for relativistic

magnetism.

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[Contd..

- 4 (a) Answer the following : (any one) 7
- (1) Describe potential function and a electromagnetic field
 - (2) Derive radiation from a quarter wave monopole or half wave dipole.
- 2 (c) Answer the following : (any one) 2
- (1) Explain Bessels function.
 - (2) Arise condition for Dielectric slab for perfect conducting surface.
 - (3) Explain working of rectangular guides, cylindrical guide.
- 3 (a) Answer the following : (any one) 8
- (1) Discuss wave impedance for TM wave in guides.
 - (2) Discuss wave impedance for TM wave in cylindrical guide.
- (b) Answer the following : (any two) 8
- (1) Describe TM and TE Waves in circular guides.
 - (2) Discuss solution of the Maxwell equation in cylindrical co-ordinate.
- (a) Answer the following : (any one) 8
- (1) Discuss electric wave in rectangular guide
 - (2) Discuss solution of the Maxwell equation in cylindrical co-ordinate.
- 3 (c) Answer the following : (any one) 2
- (1) What is Minkowski force ?
 - (2) What is Compton wave length ?
- (b) Answer the following : (any two) 8
- (1) Derive proper velocity in terms of ordinary velocity.
 - (2) Write down the Minkowski force in terms of Lorentz force and proper velocity.
 - (3) Explain Magnetic field of a point charge in uniform motion with equation.

- (b) Answer the following : (any two) 8
- (1) Discuss Hertzian oscillating electric dipole.
 - (2) Discuss solution of the potential equation.
 - (3) Write the Sine and cosine integral in appropriate mathematical step.
- (c) Answer the following : (any one) 2
- (1) Discuss the short Antennas.
 - (2) Write green function equation.



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Seat No _____

M. Sc. (Sem.-IV) Examination

March - 2024

Physics : MSPHY-403-CC

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

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

Instructions :

- (1) Draw neat diagram wherever necessary.
- (2) Symbol has their usual meaning.
- (3) Figures to the right indicate full marks of sub questions.

1 (a) Attempt any one out of two : 8

- (1) Obtain the plane wave solutions of Klein-Gordon (KG) equation and discuss charge and current densities.
- (2) Obtain plane wave solutions of the Dirac equation.

(b) Attempt any one out of two : 8

- (1) Write a note on Dirac Matrices.
- (2) Discuss the significance of negative energy state.

(c) Attempt any one out of two : 2

- (1) What are the differences between realistic and non realistic particle ?
- (2) Show that $[\alpha_x \alpha_y, \alpha_z] = 2\alpha_x$, where α 's are

(4×4) Dirac matrices.

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[Contd...

- (a) Attempt any one out of two :
 (1) Obtain total angular momentum formula in a central potential.
 (2) Explain energy spectrum and Eigen function for the electron in a magnetic field in relativistic case.
 (b) Attempt any one out of two :
 (1) Discuss spin orbit energy.
 (2) Obtain Radial wave equations in coulomb potential.
 (c) Attempt any one out of two :
 (1) State the expression for relativistic correction to K.E.
 (2) Write down formula for fine structures constant for h atom.
- 3 (a) Attempt any one out of two :
 (1) Obtain Kramers-Kronig relations for linear passive system.
 (2) Describe Mon-Wannier excitons in detail.
 (b) Attempt any one out of two :
 (1) Explain Raman effect in crystal.
 (2) Explain energy loss of fast particle in a solid and obtain a formula for power loss.
 (c) Attempt any one out of two :
 (1) What is Stokes line and anti-Stokes line ?
 (2) Write the formula for the Cauchy integral response function.
- 2 (a) Attempt any one out of two :
 (1) Obtain total angular momentum formula for the relativistic electron

$$J^2 + \frac{1}{4}h^2 = K^2$$
 (2) Explain energy spectrum and Eigen function in a central potential.
 (b) Attempt any one out of two :
 (1) Discuss spin orbit energy.
 (2) Obtain Radial wave equations in coulomb potential.
 (c) Attempt any one out of two :
 (1) State the expression for relativistic correction to K.E.
 (2) Write down formula for fine structures constant for h atom.

- 4 Attempt any one out of two : 8
- (a) (1) What is MS solar cell? Describe structure of MS solar cells and solid, liquid solar cells and its junction. 7
- (2) What is LED? Explain its principle, construction and working with its applications and with necessary figure. 7
- (b) Attempt any one out of two : 7
- (1) Write a short note on phototransistor. 7
- (2) Describe Avalanche photo diode. 7
- (c) Attempt any one out of two : 2
- (1) What is power efficiency? 2
- (2) Write down the list of application of LED. 2