

(Pages : 3)

N – 4309

Reg. No. : .....

Name : .....

**First Semester B.Sc. Degree Examination, June 2022**  
**Career Related First Degree Programme Under CBCSS**  
**Group 2(b) — Biotechnology (Multimajor)**  
**Core Course — I**  
**BV 1141.2 — ANIMAL DIVERSITY — I : NONCHORDATA**  
**(For Zoology, Chemistry and Biotechnology)**  
**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** the questions in **a** word or **one** or **two** sentences. **Each** question carries **1** mark. (Draw diagrams **only** if specified in the question)

1. What is conjugation?
2. What is a bilateria.
3. Name a freshwater sponge.
4. Name the larva of ophiuroidea.
5. Mention the name of parasite causing Kala-Azar.
6. What is heteroneries?

P.T.O.

7. Name a pest of paddy.
8. Mention the excretory organ in *Penaeus*.
9. Name the rasping organ in mollusc.
10. What is Aristotles Latern.

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer any **eight** questions. (Answer not to exceed one paragraph). **Each** question carries **2** marks.

11. Explain the structure of cnidoblast.
12. What is water vascular system?
13. Illustrate the nervous system of earth worm.
14. Differentiate between protostomia and deuterostomos.
15. Comment on spongocoel.
16. What is metagenesis?
17. Explain the asexual reproduction in *Planaria*.
18. Explain the symptoms and treatment of ancylostomiasis.
19. What is cycle of Ross?
20. Explain the commensalisms of Eupagurus and sea anemone.
21. List out four features of *Sacculina*.
22. Explain the structure of tornaria larva.

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions. (Answer not to exceed 120 words). **Each** question carries **4** marks.

23. Describe Hirudinaria. Add a note on its parasitic adaptations.
24. Explain the structure of Noctiluca and bioluminescence.
25. Describe the general characters of Phylum Porifera.
26. Explain the parasitic adaptations of Tapeworm.
27. Explain the features of cephalopoda with two examples.
28. What are the affinities of *Peripatus*?
29. Describe any four vector borne diseases.
30. Briefly explain apiculture.
31. Illustrate the cephalic appendages of prawn.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. (Not more than 3 pages). **Each** question carries **15** marks.

32. Explain pearl culture.
33. Explain the mouth parts and digestive system of Cockroach with suitable diagram.
34. Explain the Life cycle, Pathogenecity and Prophylaxis of *Entamoeba*.
35. Describe coral forming cnidarians. Add a note on coral reefs.

**(2 × 15 = 30 Marks)**

(Pages : 4)

N – 4310

Reg. No. : .....

Name : .....

**First Semester B.Sc. Degree Examination, June 2022**  
**Career Related First Degree Programme under CBCSS**  
**Group 2(b) – Biotechnology (Multimajor)**  
**Core Course I**  
**BV 1141.2 : ANIMAL DIVERSITY – I : NONCHORDATA**  
**(For Zoology, Chemistry and Biotechnology)**  
**(2020 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in a word or **one** or **two** sentences. Each question carries **one** mark (Draw diagrams only if specified in the question).

1. What is Cyclosis in *Paramecium*?
2. What is a Spongocoel?
3. What is cephalization?
4. What is metamerism?
5. What is Radula?
6. What is haemocoel?
7. What is the common name of *Euplectella*?

P.T.O.

8. Write down the scientific name of green mussel.
9. What is a Connecting link? Give one example.
10. Give the example of an animal with ladder like nervous system.

**(10 × 1 = 10 Marks)**

SECTION – B

Answer any **eight** questions. Each question carries **2** marks. (Answer not to exceed **one** paragraph).

11. Distinguish between Radial and Bilateral symmetry.
12. Write down the structure and function of Petasma.
13. Write any four salient features of Mesozoa.
14. What is holozoic nutrition?
15. What is biramous appendage?
16. Write down the adaptations of leech for Sanguivorous mode of feeding.
17. Write a note on *Opalina*.
18. Discuss the evolutionary significance of *Limulus*.
19. Comment on extra oral digestion in Echinoderms.
20. What is gastric mill?
21. Write a note on *Tornaria* larva.
22. Comment on the structure of Scolex.
23. Comment on *Heteronereis*.
24. What are Zooxanthellae?

25. What is hectocotylised arm?
26. Explain the process of evisceration in Holothuria.

**(8 × 2 = 16 Marks)**

SECTION – C

Answer any **six** questions. Answer need not exceed **120** words. Each question carries **4** marks.

27. List the salient features of Phylum Coelentrata and classify them up to class.
28. Describe the nervous system of *Penaeus* with the help of a labelled diagram.
29. Explain in detail about the diseases caused by *Entamoeba*.
30. What are the steps involved in Pearl culture?
31. Discuss in detail about any two pest of coconut.
32. What are the steps involved in rearing of silk worm?
33. Describe the morphology of earthworm with the help of a neat diagram. Add a note on its ecological importance.
34. Describe the mouthparts of cockroach with the help of a labelled diagram.
35. Classify Phylum Echinodermata citing an example from each class.
36. Discuss the classification of Phylum Platyhelminthes citing suitable examples.
37. Give a detailed account of the larval forms of *Penaeus*.
38. Describe the characteristic features of *Balanoglossus*.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. (not more than **3** pages) Each question carries **15** marks.

39. Classify Phylum Arthropoda with example from each class.
40. Describe the salient features of Phylum Annelida. Classify them up to classes.
41. Write an essay on the life cycle of parasitic nematodes citing suitable examples.
42. Explain the different types of coral reefs and mention its significance.
43. Write an essay on water vascular system in Echinoderms.
44. Write an essay on polymorphism exhibited by Phylum Coelentrata.  
**(2 × 15 = 30 Marks)**

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Reg. No. : .....

Name : .....

**First Semester B.Sc. Degree Examination, June 2022**  
**Career Related First Degree Programme under CBCSS**  
**Group 2 (b) Biotechnology Multimajor**  
**BV 1142 : INORGANIC CHEMISTRY I**  
**(2013 - 2019 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. **Each** question carries **1** mark.  
(Answer in one word to maximum of two sentences)

1. The operator  $\nabla^2$  is known as \_\_\_\_\_.
2. Radial wave function  $R(r)$  depends upon the quantum numbers \_\_\_\_\_.
3. Diphenyl amine is a \_\_\_\_\_ indicator.
4. The equivalent mass of Mohr's salt is \_\_\_\_\_.
5. When solubility product becomes \_\_\_\_\_ than ionic product, precipitation occurs.
6. The bond order in CO is \_\_\_\_\_.
7. The state of hybridization of Cl in  $\text{ClF}_3$  is \_\_\_\_\_.
8.  $\text{N}^{14}$  and  $\text{C}^{14}$  are \_\_\_\_\_.
9. Water has maximum density at \_\_\_\_\_.
10. 1.0280 contains \_\_\_\_\_ significant figures.

**(10 × 1 = 10 Marks)**

P.T.O.



## SECTION – B

Short answer type (Not exceed one paragraph)

Answer any **eight** questions. **Each** question carries **2** marks.

11. What is meant by leveling effect of solvents?
12. What are the  $n$ ,  $l$  and  $m$  values of an electron in the  $3p_z$  orbital?
13. How the dipole moment value is used to predict the structure of molecules?
14. What is an eigen value?
15. What are metallochromic indicators? Give an example.
16. Distinguish between natural and artificial radioactivity.
17. What is meant by digestion of a precipitate?
18. Define lattice energy.
19. What is free electron theory of metallic bonding?
20. Describe briefly the elimination of phosphate ion.
21. What are self-ionising solvents?
22. What are the different types of errors?

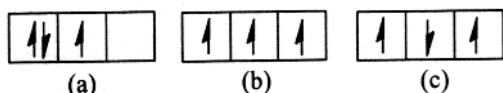
**(8 × 2 = 16 Marks)**

## SECTION – C

Short essay (Not to exceed 120 words)

Answer any **six** questions. **Each** question carries **4** marks.

23. Calculate the effective nuclear charge felt by a 3d electron of Cr ( $Z = 24$ )
24. Explain the role of common ion effect and solubility product in qualitative inorganic analysis.
25. Arrange the following electronic arrangements for  $p^3$  configuration in the order of their stability. Justify your answer.



26. Explain (a) coprecipitation (b) postprecipitation.

27. Explain Born-Harber cycle using NaCl as the example.
28. What are the salient features of MO theory?
29. Discuss the chemistry of liquid ammonia as a solvent.
30. What is mass defect? Calculate energy released in the following reaction.  
(Atomic mass (in amu) of  $U^{235}=235.044$ ,  $Ba^{141}=140.908$ ,  $Kr^{92}=91.905$ , mass of  ${}_0n^1=1.009$ )



31. Discuss the factors affecting electronegativity of an atom.

**(6 × 4 = 24 Marks)**

### SECTION – D

Long essay (Not to exceed 120 words)

Answer any **two** questions. **Each** question carries **15** marks.

32. (a) Discuss the features of VSEPR theory.  
(b) Discuss the shapes of  $XeF_4$ ,  $IF_7$ ,  $H_3O^+$  and  $NH_3$  on the basis of VSEPR theory.
33. Explain
  - (a) Nuclear stability
  - (b)  $C^{14}$  dating
  - (c) Neutron activation analysis
34. Derive the Schrodinger wave equation for a particle in a one-dimensional box and show that the energy levels are quantized.
35. Explain
  - (a) Complexometric titrations.
  - (b) Theory of acid-base indicators.

**(2 × 15 = 30 Marks)**

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N – 4312

Reg. No. : .....

Name : .....

**First Semester B.Sc. Degree Examination, June 2022**  
**Career Related First Degree Programme under CBCSS**  
**Group 2(b) Biotechnology Multimajor**  
**Core Course**  
**BV 1142 : INORGANIC CHEMISTRY I**  
**(2020 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. **Each** question carries **1** mark.

1. What is the half-life period of  $U^{238}$  isotope?
2. What are the group reagents used for the precipitation of group V cations in qualitative analysis?
3. Give an example for a protic non-aqueous solvent.
4. What is the geometry of  $XeF_4$ ?
5. Write the ground state orbital electronic configuration of nitrogen atom.
6. Who discovered natural radioactivity?
7. What happen for N/P ratio when a nuclide decays by  $\beta$ – emission?

P.T.O.

8. What are the  $n$  and  $l$  values of 3d orbital?
9. Give an example for a metallochromic indicator.
10. What is the H-O-H bond angle in  $H_2O$ ?

**(10 × 1 = 10 Marks)**

SECTION – B

Answer any **eight** questions. Each question carries **2** marks

11. What is electron gain enthalpy?
12. Explain the principle and procedure of elimination of fluoride anion.
13. Distinguish between natural and artificial radioactivity.
14. Distinguish between orbit and orbital.
15. What is meant by co-precipitation?
16. What is common ion effect?
17. What are eigen functions?
18. Define lattice energy.
19. State Geiger-Nuttal rule.
20. State and explain Pauli's exclusion principle.
21. What is meant by half-life period of a radio isotope?
22. Draw the radial probability distribution curve for 3p orbital.
23. Distinguish between inter and intramolecular hydrogen bonding.
24. Solution of alkali metals in liquid ammonia is paramagnetic. Why?

25. Explain the structure of rutile.
26. Schrodinger's wave equation for particle in a one-dimensional box.

**(8 × 2 = 16 Marks)**

SECTION – C

Answer any **six** questions. **Each** question carries **4** marks.

27. Explain gas chromatography.
28. Define electronegativity. Calculate the electronegativity of carbon. Covalent radius of carbon atom is  $0.77\text{\AA}$ .
29. Write a note on quantum numbers.
30. State and explain Heisenberg's uncertainty principle.
31. Explain the theory of redox indicators.
32. Calculate age of a uranium mineral that contains 15% w/w  $^{206}\text{Pb}$ . Half-life of  $^{238}\text{U}$  is  $4.5 \times 10^9$  years.
33. Write a note on nuclear stability and n/p ratio.
34. Explain the VB theory of  $\text{H}_2$  formation.
35. What are the factors affecting solubility of precipitates?
36. Discuss the self-ionisation of liquid  $\text{SO}_2$  and liquid HF.
37. Explain Fajan's rules.
38. Explain nuclear fission reaction with a suitable example.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. **Each** question carries **15** marks.

39. Give a detailed account on radius ratio rule, its applications and limitations.
40. Explain the various electronegativity scales.
41. Discuss the shapes of  $\text{ClF}_3$ ,  $\text{IF}_5$ ,  $\text{NH}_3$  and  $\text{H}_3\text{O}^+$  on the basis of VSEPR theory.
42. Write a note on
  - (a) Complexometric titrations
  - (b) Ostwald theory of acid-base indicators.
43. Discuss the following
  - (a) Induction forces and dispersion forces.
  - (b) Various concepts of acids and bases.
44. Explain
  - (a) Modes of radioactive decay.
  - (b) Neutron activation analysis.
  - (c) Carbon dating.

**(2 × 15 = 30 Marks)**

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(Pages : 3)

**N – 4313**

Reg. No. : .....

Name : .....

**First Semester B.Sc. Degree Examination, June 2022**  
**Career Related First Degree Programme under CBCSS**  
**Group 2(b) Biotechnology Multimajor**  
**BV 1143 : BIOCHEMISTRY AND METABOLISM**  
**(2013-2018 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in a word or **one** or **two** sentences. **Each** question carries **1** mark. Draw diagrams only if specified in the question.

1. Define active site of an enzyme.
2. Name an organic molecule in biological system with two carbon-nitrogen rings.
3. What are amino-acyl tRNAs?
4. What are amphoteric substances?
5. Define beta-oxidation.
6. How buffers stabilize the  $p^H$  of the biological solutions?
7. What are anomers?
8. What are zymogens?

P.T.O.

9. Write down the committed step of Glycolysis?
10. What are triglycerides?

**(10 × 1 = 10 Marks)**

SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks. Answer not to exceed **one** paragraph.

11. Write down Henderson-Hasselbalch equation
12. How normality is different from molarity?
13. How colloids are different from crystalloids?
14. Draw the structure of  $\beta$ -D, fructopyranose.
15. Define Michaelis-Menten constant.
16. What are coenzymes?
17. What is Line-weaver Burk plot?
18. What is isoelectric point?
19. Explain the biosynthesis of glycogen.
20. Calculate the net energy of TCA cycle.
21. What is mutarotation?
22. How globular protein is different from fibrous proteins?

**(8 × 2 = 16 Marks)**



## SECTION – C

Answer any **six** questions. **Each** question carries **4** marks. Answer not to exceed **120** words.

23. Comment on osmosis and its biological significance.
24. How carbohydrates are classified? Explain each category with proper examples.
25. Discuss the dark reaction of photosynthesis?
26. Explain the steps involved in the beta-oxidation of fatty acids.
27. Explain competitive and non-competitive enzyme inhibition with proper examples.
28. Discuss the secondary and tertiary structure of proteins.
29. What are phospholipids? Mention some important phospholipids and explain their role.
30. What is Glycolysis? Explain the different steps involved in it.
31. What are colloids? Explain the different types with their uses.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. **Each** question carries **15** marks. Answer not to exceed **three** pages.

32. Explain electron transport chain and oxidative phosphorylation.
33. How amino acids are classified? Explain each category with structure of all amino acids involved.
34. Discuss the double helix model of DNA with diagram.
35. Explain the biosynthesis of fatty acids and triglycerides.

**(2 × 15 = 30 Marks)**

(Pages : 3)

**N – 4314**

Reg. No. : .....

Name : .....

**First Semester B.Sc. Degree Examination, June 2022**  
**Career Related First Degree Programme under CBCSS**  
**Group 2(b) – Biotechnology Multimajor**  
**BV 1143 : BIOCHEMISTRY AND METABOLISM**  
**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** the questions in a word or **one** or **two** sentences. Each question carries **1** mark.

1. What is a nucleoside?
2. Name a qualitative test for carbohydrates.
3. What is saponification number?
4. State Vant Hoff's law.
5. What are zwitter ions?
6. List any two factors affecting enzyme action.
7. Draw the structure of cerebroside.

**P.T.O.**

8. What is osazone?
9. Define isoelectric point.
10. Write Henderson-Hasselbalch equation.

**(10 × 1 = 10 Marks)**

SECTION – B

Answer any **eight** questions. Each question carries **2** marks. (Answer not to exceed **one** paragraph)

11. What are emulsions?
12. Explain allosteric inhibition of enzymes.
13. What is mutarotation?
14. Define osmosis. What is its importance?
15. What are the structural features of water molecule?
16. Brief a note on  $\alpha$  oxidation of fatty acids.
17. Comment on conjugated proteins.
18. What are pyrimidines? Give examples.
19. Give the biological significance of glucose.
20. What is sphingomyelin?
21. Mention the application of Lineweaver-Burk plot.
22. What are coenzymes? Give examples.

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions. Each question carries **4** marks. (Answer not to exceed **120** words)

23. State the difference between ribose and deoxy ribose sugar.
24. Explain the structure and function of haemoglobin.
25. Describe the secondary structure of proteins.
26. What is the function of buffers in biological system?
27. Discuss the role of amphipathic lipids in cell structure and function.
28. Describe the structure and properties of maltose.
29. Explain the mechanism of enzyme action.
30. What are colloids? What is its biological significance?
31. Explain the chemiosmotic coupling hypothesis.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. Each question carries **15** marks. (Answer not to exceed **three** pages)

32. Write an essay on IUB system of classification and nomenclature of enzymes.
33. Explain the structure and properties of starch and cellulose.
34. Describe the structure of Watson and Crick model of DNA.
35. Explain the structure and biological role of phospholipids.

**(2 × 15 = 30 Marks)**

(Pages : 4)

**N – 4315**

Reg. No. : .....

Name : .....

**First Semester B.Sc. Degree Examination, June 2022**  
**Career Related First Degree Programme under CBCSS**  
**Group 2(b) – Biotechnology Multimajor**  
**BV 1143 : BIOCHEMISTRY AND METABOLISM**  
**(2020 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** the questions in a word or **one** or **two** sentences. Each question carries **1** mark.

1. What are histones?
2. Define glycolysis.
3. What is acrolein test?
4. State Vain Hoff's law.
5. What is Michaelis – Menten constant?
6. What is an acid number?
7. Write Henderson-Hasselbalch equation.
8. What are zwitter ions?
9. Define an anomer.
10. What is a holoenzyme?

**(10 × 1 = 10 Marks)**

P.T.O.

## SECTION – B

Answer any **eight** questions. Each question carries **2** marks. (Answer not to exceed **one** paragraph)

11. What is a nucleoside?
12. Explain allosteric inhibition of enzymes.
13. Give the biological significance of glucose.
14. What are the functions of phospholipids?
15. What is surface tension?
16. Write any two qualitative tests for carbohydrates.
17. What is molarity?
18. Draw the structure of cerebroside.
19. What are conjugated proteins?
20. What is  $\alpha$  oxidation of fatty acids?
21. Differentiate between lyophilic and lyophobic colloids.
22. What is a buffer? What is its importance?
23. Brief a note on osazone and its applications.
24. What are plasma proteins? Explain its types.
25. Define coenzymes. Give examples.
26. What is pH?

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions. Each question carries **4** marks. (Answer not to exceed **120** words)

27. What is paper chromatography? Explain its principle.
28. Describe the structure and properties of maltose.
29. Give an outline on the synthesis of triglycerides.
30. Discuss the structural features of water molecule.
31. What is osmosis? What is its biological significance?
32. Explain the secondary structure of proteins.
33. Bring out the structural difference between ribose and deoxyribose.
34. Explain the mechanism of enzyme action.
35. Give a brief note on different types of RNA.
36. What are amphipathic lipids? Discuss their role in cell structure and function.
37. Comment on emulsions and emulsifying agents.
38. What is Lineweaver-Burk plot? What is its application?

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. Each question carries **15** marks. (Answer not to exceed **three** pages)

39. Explain the general structure and classification of amino acids.
40. What are fatty acids? Give an account on classification of fatty acids with examples.

41. Explain the structure and properties of any three polysaccharides.
42. Write an essay on IUB system of classification and nomenclature of enzymes.
43. What is oxidative phosphorylation? Explain electron transport system during carbohydrate metabolism.
44. Compare and contrast the structure of RNA and DNA.

**(2 × 15 = 30 Marks)**

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(Pages : 3)

N – 4317

Reg. No. : .....

Name : .....

**First Semester B.Sc. Degree Examination, June 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**Complementary Course I**

**BV 1131.1 : ANIMAL DIVERSITY – NON-CHORDATA AND CHORDATA**

**(For Botany, Chemistry and Biotechnology)**

**(2015 – 2019 Admission)**

Time : 3 Hours

Max. Marks : 80

I. Answer **all** the questions in **one** or **two** sentences. **Each** question carries **1** mark.

1. What is neoteny?
2. What is slipper animalcule?
3. What is Portugese man of war?
4. Define filariasis.
5. Explain parasitic castration with an example.
6. What is cuttle fish?
7. What is anadromous migration?
8. What are Synapsids?

P.T.O.

9. What is blubber?
10. Name a nocturnal primate in South India.

**(10 × 1 = 10 Marks)**

II. Answer any **eight** of the following questions. **Each** question carries **2** marks. (Not to exceed one paragraph)

11. What is alternation of generation?
12. Explain the concept of conjugation in *Paramecium*.
13. What are flat worms?
14. Comment on green glands.
15. What is hermaphroditism? Give an example.
16. Comment on Narcine.
17. What are tusk shells?
18. Briefly explain retrogressive metamorphosis with an example
19. Comment on Peteromyzon.
20. Briefly explain brood pouch.
21. What are caecilians?
22. Comment on flippers.

**(8 × 2 = 16 Marks)**

III. Answer any **six** of the following questions. **Each** question carries **4** marks. (Not to exceed **120** words)

23. Give an account on the life history of *Plasmodium*.
24. Explain polymorphism in *Obelia*.
25. Briefly describe the parasitic adaptations of *Taenia solium*.
26. Which are the major human nematode parasites?

27. Give an account on the mouth parts of cockraoach.
28. What are sea cucumbers? Explain their role in its ecosystem?
29. Explain the salient features of Urochordates.
30. Give an account on the general characters of amphibians and classify upto orders.
31. Comment on the morphological adaptations of *Draco*.

**(6 × 4 = 24 Marks)**

IV. Answer any **two** of the following questions. **Each** question carries **15** marks.

32. Give an account on corals and coral reefs.
33. Write an essay on the salient features of Phylum Chordata.
34. What are the flight adaptations of birds?
35. Give an account on the major poisonous and non poisonous snakes of Kerala.

**(2 × 15 = 30 Marks)**

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(Pages : 4)

**N – 4318**

Reg. No. : .....

Name : .....

**First Semester B.Sc. Degree Examination, June 2022**  
**Career Related First Degree Programme Under CBCSS**  
**Group 2(b) – Biotechnology (Multimajor)**  
**Complementary Course I**  
**BV 1131.1 – ANIMAL DIVERSITY – NON-CHORDATA AND CHORDATA**  
**(For Botany, Chemistry and Biotechnology)**  
**(2020 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in a word or one to two sentences. Each question carries **1** marks. Draw diagrams only if specified in the question.

1. What are filter feeders?
2. What is Diphyodont condition?
3. Which protist has symbiotic relationship with wood eating insects?
4. What are jelly fishes?
5. Define Metagenesis.
6. The agent that causes liver rot in sheep is \_\_\_\_\_
7. Name the infective stage of *Ancylostoma*

P.T.O.

8. Rasping organ of mollusc is called \_\_\_\_\_
9. Name the state fish of Kerala.
10. What is endostyle? Explain its function.

(10 × 1 = 10 Marks)

### SECTION – B

Answer **any eight** questions. **Each** question carries **2** marks. Answer not to exceed one paragraph.

11. What are the salient features of *Ascidia*?
12. Distinguish nereis and *heteronereis*.
13. Explain the features of *Sycon*.
14. What are the adaptations of *Enhydrina*?
15. Write important morphological features of *Hippocampus*.
16. Write on the role of Entamoeba as human parasite.
17. Write a short on the sanguivorous features of leech.
18. Write short note on digestive glands in *Penaeus*.
19. Comment on Parasitic castration caused by *Sacculina*.
20. Distinguish mosaic and superimposed vision.
21. Write a note on digestive glands of human.
22. Give a short note on adaptations of Chameleon.
23. What are the adaptations of Penguins?
24. What are the Mammalian Affinities of *Echidna*?

25. Write a paragraph on echolocation in bats.
26. Briefly Explain the features of limbless amphibian with example.

**(8 × 2 = 16 Marks)**

### SECTION – C

Answer **any six** questions. (Answer not exceed **120** words). **Each** question carries **4** marks.

27. Write an account on human ear with illustration.
28. Write an account on features of poisonous snakes.
29. Write on ambystoma and neoteny.
30. Write an account on the features of Phylum Annelida.
31. Write an account on common pearl oysters used for pearl culture.
32. With illustration describe human heart.
33. With illustration briefly explain mouth parts of cockroach.
34. Comment on the pathogenicity caused by Plasmodium in human.
35. Write an account on cephalic appendages of Penaeus.
36. Add note on the classification and features of Platyhelminthes.
37. Explain the features of class Amphibia with examples.
38. With the help of a diagram, describe the ventricles in the human brain.

**(6 × 4 = 24 Marks)**

SECTION – D

Answer **any two** questions. (Not more than three pages). **Each** question carries **15** marks.

39. Write an essay on the nematode parasites of human.
40. With an illustration describe the polymorphism in obelia. Comment on the alternation of generation in obelia.
41. Write an essay on the adaptations of aquatic mammals with suitable examples
42. Write an account on the morphology of Penaeus.
43. Give an account on flight adaptations in birds.
44. Write an account on the features and classification of Phylum Echinodermata upto classes with examples.

**(2 × 15 = 30 Marks)**

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(Pages : 3)

N – 4319

Reg. No. : .....

Name : .....

**First Semester B.Sc. Degree Examination, June 2022**  
**Career Related First Degree Programme Under CBCSS**  
**Group 2(b) – Biotechnology (Multimajor)**

**BV 1131.2 – PHYCOLOGY, MYCOLOGY, LICHENOLOGY, BRYOLOGY,  
PTERIDOLOGY, GYMNOSPERMS AND PLANT PATHOLOGY**

**(2013 – 2018 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in **one** or **two** sentences. **Each** question carries **1** mark.

1. Powdery mildew of rubber is caused by \_\_\_\_\_?
2. What are Macro cyclic fungi?
3. Define hologamy.
4. What are crustose lichens?
5. What is gemma?
6. What is the function of elaters?
7. What is a coenobium?

P.T.O.



8. Name two aquatic species of ferns
9. What are 'Bars of Sanio'?
10. Name an edible algae.

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer **any eight** questions not exceeding one paragraph. **Each** question carries **2** marks.

11. Why bryophytes are known as amphibians of plant kingdom.
12. What are long shoots of Pinus?
13. What is calyptra? Mention its function.
14. Define palmella stage. Cite an example.
15. Explain thallus of Funaria.
16. What are tuberculate rhizoids?
17. What is dwarf male?
18. Mention the structure of sporangia in Selaginella.
19. Differentiate between ascus and basidium.
20. What is the composition of Bourdeaux mixture?
21. Write the importance of heterospory.
22. What are the various modes of asexual reproduction in lichens?

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer **any six** of the following; not to exceed **120** words. Each question carries **4** marks.

23. Describe the macrandous type of life cycle in Oedogonium.
24. Explain the assimilatory zone in Riccia with suitable diagram.
25. Give an account on the preparation and use of Neem decoction.
26. Describe the sex organs in Chara.
27. Explain different methods of asexual reproduction in fungi.
28. Enumerate the major characteristics of Zygomycotina
29. Describe the structure of protahllus in Pteris with suitable diagram.
30. Briefly describe the symptoms and control measures of Quick wilt of Pepper.
31. List out the ecological and economical importance of lichens.

**(6 × 4 = 24 Marks)**

## SECTION – D

Write an essay on **any two** of the following. Each question carries **fifteen** marks.

32. Explain the development of basidiocarp in Agaricus.
33. Describe the life cycle of Puccinia with suitable diagrams.
34. Describe the sexual reproduction and post fertilization changes in Polysiphonia.
35. Explain the life cycle of Pinus.

**(2 × 15 = 30 Marks)**

Reg. No. : .....

Name : .....

**First Semester B.Sc. Degree Examination, June 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**BV 1131.2 : PHYCOLOGY, MYCOLOGY, LICHENOLOGY, BRYOLOGY,  
PTERIDOLOGY, GYMNOSPERMS AND PLANT PATHOLOGY**

**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** the questions in **a word** or **one** or **two** sentences. **Each** question carries **1** mark.

1. What is ligule?
2. Name two natural fungicides.
3. What is heteroecious fungus?
4. Define apospory.
5. What is the function of rhizoids in *Riccia*?
6. Define zoospore.
7. What is ovuliferous scale?
8. List any two industrial uses of fungi.

P.T.O.

9. Why Bryophytes are known as the amphibians of plant kingdom?
10. What is a cryptoblast?

**(10 × 1 = 10 Marks)**

SECTION – B

Answer any **eight** questions **Each** question carries **2** marks. (Answer not to exceed **one** paragraph)

11. What are the symptoms of quick wilt of pepper?
12. Describe the vegetative structure of *Rhizopus*.
13. What is the function of peristome teeth?
14. List the economic importance of peat moss
15. What is a heterocyst? What is its function?
16. Write the preparation of Bordeaux mixture.
17. What is a cystocarp?
18. Discuss the ecological significance of Lichens.
19. What is heterothallism?
20. Describe the stele in *Selaginella*.
21. Why *Chlorella* is used in space ships?
22. What is polyembryony? Give an example.

**(8 × 2 = 16 Marks)**

SECTION – C

Answer any **six** questions. **Each** question carries **4** marks. (Answer not to exceed **120** words)

23. Describe the prothallus in *Pteris*.
24. Explain the formation of cap cells in *Oedogonium*.

25. Discuss the thallus organization in algae.
26. Describe the internal structure of *Riccia* thallus.
27. Illustrate the internal structure of *Pinus* needle
28. Describe the structure of apothecium in *Usnea*.
29. Explain asexual reproduction in *Penicillium*.
30. Discuss the origin and structure of rhizophore in *Selaginella*.
31. Explain the disease cycle and control measures in powdery mildew of rubber.

**(6 × 4 = 24 Marks)**

SECTION – D

Answer any **two** questions. **Each** question carries **15** marks. (Answer not to exceed three pages)

32. “Heterospory leads to seed habit”. Discuss.
33. Give an account on general characters of Gymnosperms.
34. Explain the structure of sex organs and sexual reproduction in *Chara*.
35. Describe the life cycle of *Puccinia* with suitable diagrams.

**(2 × 15 = 30 Marks)**

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(Pages : 4)

N – 4321

Reg. No. : .....

Name : .....

**First Semester B.Sc. Degree Examination, June 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**BV 1131.2 : PHYCOLOGY, MYCOLOGY, LICHENOLOGY, BRYOLOGY,  
PTERIDOLOGY, GYMNOSPERMS AND PLANT PATHOLOGY**

**(2020 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in a word or **one** or **two** sentences. **Each** question carries **1** mark.

1. Name two natural fungicides.
2. Define a prothallus.
3. What are amyllum stars?
4. What is transfusion tissue?
5. Name a heteroecious fungus.
6. Define apogamy.
7. What is the reserve food material in Rhodophyceae?
8. Name an aquatic species of *Riccia*.

P.T.O.

9. Why Bryophytes are known as the amphibians of plant kingdom?
10. What is a mycobiont?

**(10 × 1 = 10 Marks)**

SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks. (Answer not to exceed **one** paragraph)

11. What is columella? What is its function?
12. List any four economic importance of Bryophytes.
13. Describe the organization of plant body in *Sargassum*.
14. Write a note on rhizoids in *Riccia*.
15. What is heterothallism?
16. Lichens acts as indicators of pollution. Justify.
17. Describe the stele in *Pteris* petiole.
18. What are aplanospores?
19. Explain the structure of cone in *Selaginella*.
20. Why *Chlorella* is used in space ships?
21. What is polyembryony? Give an example.
22. Describe the sporangium of *Rhizopus*.
23. What are the symptoms of powdery mildew of Rubber?

24. Differentiate between uredospore and teleutospore.
25. Explain the structure and functions of heterocyst.
26. List the xerophytic adaptations of *Pinus* needle.

**(8 × 2 = 16 Marks)**

SECTION – C

Answer any **six** questions. **Each** question carries **4** marks. (Answer not to exceed **120** words)

27. Describe the origin and structure of rhizophore in *Selaginella*.
28. Explain the mode of reproduction in *Usnea*.
29. Briefly describe the post fertilization changes in *Polysiphonia*.
30. Describe the prothallus in *Pteris*.
31. Describe asexual reproduction in *Penicillium*.
32. Explain the structure of *Funaria* capsule.
33. Write a note on thallus organization in algae.
34. Describe the fruiting body of *Peziza* with a suitable diagram.
35. Describe the structure of male cone in *Pinus*.
36. Explain the sex organs in *Chara*.
37. Describe the internal structure of *Riccia* thallus.
38. What is Lime sulphur? How is it prepared?

**(6 × 4 = 24 Marks)**



SECTION – D

Answer any **two** questions. **Each** question carries **15** marks. (Answer not to exceed **three** pages)

39. What are the general characters of Gymnosperms? Describe the affinities of Gymnosperm with Pteridophytes.
40. Describe the gametophytic and sporophytic generations in *Riccia*.
41. With suitable illustrations, describe the thallus structure and reproduction of *Oedogonium*.
42. "Heterospory leads to seed habit". Discuss.
43. Explain the disease cycle and control measures in Brown spot disease of paddy and quick wilt of pepper.
44. Give an account on economic importance of fungi.

**(2 × 15 = 30 Marks)**

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(Pages : 3)

**N – 4322**

**Reg. No. :** .....

**Name :** .....

**First Semester B.Sc. Degree Examination, June 2022**  
**Career Related First Degree Programme Under CBCSS**  
**Group 2 (b) : Biotechnology (Multimajor)**  
**Foundation Course**

**BV 1121: METHODOLOGY AND PERSPECTIVES OF BIOTECHNOLOGY**  
**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** the questions in a word or one or two sentences. Each question carries **1** mark.

1. Give note on secondary data?
2. What is UNIX?
3. Define Science.
4. Comment on NCBI.
5. Comment on robotics.
6. Define hypothesis?
7. What is Gene therapy?
8. What is probability?

**P.T.O.**

9. What is warrantee?
10. Comment on sewage?

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer **any eight** questions. Each question carries **2** marks. (Answer not to exceed **one** paragraph.)

11. Give note on Bt cotton.
12. What is application software?
13. Comment on science vocabulary.
14. What is cyber crime?
15. Explain Standard deviation.
16. Comment on GMP.
17. what is fermentation?
18. What is P value?
19. Explain BRNET.
20. Give note on MATLAB.
21. What is latex?
22. Define hypothesis.

**(8 × 2 = 16 Marks)**

### SECTION – C

Answer **any six** questions. Each question carries **4** marks.  
(Answer not to exceed **120** words)

23. Describe Good Laboratory Practices (GLP).
24. Differentiate between primary and secondary data.
25. Explain hypotheticodeductive model of formulation of a hypothesis.
26. Write a short essay on measurement of dispersion.
27. Give a note on the advancement in Medical Biotechnology.
28. What is Probability? Explain with examples.
29. Define plagiarism. Discuss about useful tools to identify plagiarism.
30. Describe in detail different depositories of scientific information.
31. Briefly discuss the commercial potential of Biotechnology in India.

**(6 × 4 = 24 Marks)**

### SECTION – D

Answer **any two** questions. Each question carries **15** marks. (Answer not to exceed **3** pages.)

32. Write an essay on Genetically Modified crops and its impact on agriculture.
33. Given an essay on modern Biotechnology and its applications.
34. What is meant by significance test? Explain level of significance.
35. Explain the different methods of diagrammatic and graphic representation of data. What are its advantages?

**(2 × 15 = 30 Marks)**

(Pages : 4)

**N – 4323**

**Reg. No. :** .....

**Name :** .....

**First Semester B.Sc. Degree Examination, June 2022**  
**Career Related First Degree Programme under CBCSS**  
**Group 2 (b) : Biotechnology (Multimajor)**  
**Foundation Course**

**BV 1121 : METHODOLOGY AND PERSPECTIVES OF BIOTECHNOLOGY**  
**(2020 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Very short answer type. Maximum **two** sentences. Answer **all**.

1. What is UNIX?
2. What is biopharming?
3. Comment on Terminator Seeds.
4. Define probability.
5. Explain arithmetic mean.
6. What is secondary data?
7. What are GMOs?
8. Define patent.

**P.T.O.**

9. What is sewage?
10. Comment on robotics.

**(10 × 1 = 10 Marks)**

### SECTION – B

Short answer questions. Not exceed in one paragraph. Answer any **eight**.

11. What is Scilab?
12. What is scientific temper?
13. Write short note on hybridoma technology.
14. Define knowledge.
15. Explain Plagiarism.
16. What is P value?
17. Define Hypothesis.
18. What is Standard deviation?
19. Comment on MATLAB.
20. What is fermentation?
21. Explain genetic engineering.
22. Give a short note on science vocabulary.
23. What is INFLIBNET?
24. What is sensitivity of instruments?
25. Explain single cell protein.
26. Give note on LaTeX.

**(8 × 2 = 16 Marks)**

## SECTION – C

Short essay. Not to exceed 120 words. Answer any **six**.

27. Give note on major biotechnology institutes and companies in India.
28. What is a scientific theory? Give an example.
29. Describe in detail different depositories of scientific information.
30. Give note on scientific knowledge.
31. Discuss the guidelines for identifying the patentability of a scientific invention.
32. Differentiate between controlled and uncontrolled observations.
33. Give note on Good Laboratory Practices (GLP).
34. Write short note on the applications of biotechnology in agriculture.
35. Give a note on the advancement in Medical Biotechnology.
36. What is the use of controls in an experiment? Explain the positive and negative controls used in an experiment with examples.
37. Write a short note on Genetically Modified crops.
38. Differentiate between primary and secondary data.

**(6 × 4 = 24 Marks)**

## SECTION – D

Long essay. Answer any **two** questions.

39. Describe in detail the scope of biotechnology.
40. Write a short essay on the significance of statistical methods in biological investigations.
41. Describe in detail the importance of experimentation in Science.

42. Explain the various methods of graphical and diagrammatic representation of scientific data.
43. What is IPR? Explain its applications in biotechnology.
44. Write an essay on application of IT in human wellbeing.

**(2 × 15 = 30 Marks)**

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(Pages : 3)

**N – 4324**

**Reg. No. :** .....

**Name :** .....

**First Semester B.Sc. Degree Examination, June 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2 (b) : Biotechnology (Multimajor)**

**Core Course — 1**

**BV 1141.1 : MICROTECHNIQUE ANGIOSPERM ANATOMY,**

**REPRODUCTIVE BOTANY AND PALYNOLOGY**

**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions each in one word or sentence. Each question carries **1** mark.

1. What is micrometry?
2. Define plasmodesmata.
3. What is maceration?
4. What are ergastic substances?
5. Define meristem.
6. What is sap wood?
7. Define stomata.
8. What is the use of a microtome?

**P.T.O.**

9. What are synergids?
10. Define quiescent center.

**(10 × 1 = 10 Marks)**

**SECTION – B**

Answer **any eight** questions. Answer not to exceed a paragraph. Each questions carries **2** marks.

11. What is double fertilization?
12. Explain venation and its types.
13. Write notes on mounting media.
14. Describe the structure of periderm.
15. Comment on endosperm and its types.
16. Give a brief account on viability test for pollen grains.
17. Write a brief account on Camera lucida.
18. Discuss the stelar organization in roots.
19. Give a brief account on polyspermy.
20. Differentiate between collateral and bicollateral vascular bundles.
21. What are annual rings? Comment on their role.
22. Distinguish between primary and secondary meristems.

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer **any six** questions. Answer not to exceed **120** words. Each questions carries **4** marks.

23. Describe the structure of an anatropous ovule. Draw labelled diagram.
24. Mention the objectives of Plant Anatomy.
25. Give a brief account on simple tissues.
26. Comment on different types of vascular arrangements.
27. Write a brief note on killing and fixing agents.
28. Describe the structure of a dicot embryo.
29. Explain the anomalies in *Bignonia* stem.
30. Give an account of cambium.
31. Describe the structure of a monosporic embryosac.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer **any two** questions. Answer not to exceed **three** pages. Each questions carries **15** marks.

32. Discuss in detail stains and staining techniques. Add a note on double staining.
33. Describe the anatomy of a mature anther and explain the process of microsporogenesis.
34. With the help of a labelled diagram, describe the anatomy of a dorsiventral leaf.
35. Write a detailed account on structure and functions of a eukaryotic cell wall.

**(2 × 15 = 30 Marks)**

(Pages : 4)

N – 4325

Reg. No. : .....

Name : .....

**First Semester B.Sc. Degree Examination, June 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2(b): Biotechnology (Multimajor)**

**Core Course – 1**

**BV 1141.1 : MICROTECHNIQUE ANGIOSPERM ANATOMY,  
REPRODUCTIVE BOTANY AND PALYNOLOGY**

**(2020 Admission onwards)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions in a word or sentence. **Each** question carries **1** mark.

1. What is micrometry?
2. Define plasmodesmata.
3. What is maceration?
4. What are ergastic substances?
5. Define meristem.
6. What are lenticels?
7. What is secondary growth?
8. Define embryology.

P.T.O.

9. Comment on pollen allergy.
10. What are integuments?

**(10 × 1 = 10 Marks)**

**SECTION – B**

Answer any **eight** questions. Answer not to exceed a paragraph. **Each** question carries **2** marks

11. Write a brief note on Camera lucida.
12. Distinguish between primary and secondary meristem.
13. What is meant by double staining?
14. Mention the role of mounting media. Give example.
15. What are pits? Mention major types.
16. Differentiate between free nuclear and cellular endosperms.
17. What is meant by accessory cambium? Give example.
18. Explain the structure of pollen grain.
19. Comment on quiescent center.
20. What is tapetum? Mention its function.
21. What are annual rings? Comment on its significance.
22. Distinguish between storied and non storied cambium.
23. Comment on microtome and its types.

24. Write a brief note on polyspermy.
25. Brief a note on ground tissues.
26. What are bicollateral vascular bundles? Give example.

**(8 × 2 = 16 Marks)**

SECTION – C

Answer any **six** questions. Answer not to exceed 120 words. Each question carries **4** marks.

27. Write short notes on double fertilization.
28. Describe the extra stelar secondary thickening in dicot stem.
29. Comment on the structure and function of stomata.
30. Draw labelled diagram of a typical angiosperm ovule.
31. Mention the objectives of plant anatomy.
32. Comment on simple tissue and its types.
33. Explain the methods of viability test for pollen grains.
34. Comment on different type of vascular arrangements.
35. Explain the importance of palynology in taxonomy.
36. Give a brief account of pollination and its types.
37. Write an account on killing and fixing agents.
38. Describe the structure of a dicot embryo.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. Answer not to exceed three pages. Each question carries **15** marks.

39. Write detailed account on structure and functions of cell wall.
40. Explain in detail the anomalous secondary thickening in *Bignonia*. Draw labelled diagrams.
41. Give an account of meristems. Add notes on apical meristems and theories on its organization.
42. Describe the internal structure of a mature anther. Add details of microsporogenesis.
43. With the help of labelled diagram, describe the anatomy of a dorsiventral leaf.
44. What is microscopy? Give an account on different types of microscopes.

**(2 × 15 = 30 Marks)**

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(Pages : 3)

**M – 2655**

**Reg. No. :** .....

**Name :** .....

**Second Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme under CBCSS**

**Group 2 (b) : Biotechnology (Multimajor)**

**Complementary Course**

**BV 1231.2 : PLANT PHYSIOLOGY, ANGIOSPERM ANATOMY AND  
REPRODUCTIVE BOTANY**

**(2014–2018 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions.

1. What are tyloses?
2. What are annual rings?
3. What is photolysis?
4. Who proposed Histogen theory?
5. What is guttation?
6. What are concentric bundles?
7. What is imbibition?

P.T.O.



8. What are cytochromes?
9. What is porogamy?
10. What are synergids?

**(10 × 1 = 10 Marks)**

SECTION – B

Answer any **eight** questions.

11. Explain briefly photoperiodism.
12. What are the different types of transpiration?
13. Explain non cyclic photophosphorylation.
14. Explain briefly osmotic theory of active water absorption.
15. Write a note on selerenchyma.
16. What are the characteristics of C<sub>4</sub> plants?
17. Explain protoplasmic streaming theory.
18. Write a note on factors affecting transpiration
19. What is scenescence?
20. What are the uses of auxins?
21. What are antitranspirants?
22. How heart wood differs from sap wood?

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions (not exceed **120** words):

23. Explain stelar secondary thickening.
24. Write a note on different types of vascular bundles.
25. Explain various theories for organization of apical meristems of root.
26. Write a note on *Capsella* type of embryo development.
27. Write a note on secretory tissues.
28. Write a note on photoperiodism.
29. Explain different phases of growth.
30. Explain Calvin cycle briefly.
31. Write a note on complex tissues in plants.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions (not more than **3** pages)

32. Write an essay on ascent of sap.
33. What is microsporogenesis? Explain the wall layers of mature anther.
34. Explain photorespiration with sketches.
35. Write an essay on Secondary thickening in *Boerhaavia*.

**(2 × 15 = 30 Marks)**

(Pages : 3)

**M – 2657**

Reg. No. : .....

Name : .....

**Second Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**BV 1243 : INORGANIC CHEMISTRY II**

**(2014–2019 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions. Answer in one word to maximum two sentences. Each question carries **1** mark.

1. Give the IUPAC name for  $[\text{Co}(\text{en})_3]\text{Cl}_3$ .
2. Draw the structure of ferrocene.
3. Define coordination number.
4. What are silicones?
5. Which macromolecule serves as the oxygen storage in muscle cells?
6. What is a heme protein?
7. What is borosilicate glass?
8. What are fullerenes?
9. What is EAN rule?
10. What is the general electronic configuration of lanthanides?

**(10 × 1 = 10 Marks)**

P.T.O.

## SECTION – B

Short answer type. Answer **any eight** questions. Each question carries **2** marks.

11. What is photosynthesis?
12. Calculate the spin only magnetic moment of  $[\text{Fe}(\text{CN})_6]^{3-}$ .
13. What are high spin complexes? Give an example.
14. Explain atomic absorption spectroscopy.
15. What are metalloporphyrins?
16. Give a method for the preparation of dibenzene chromium.
17. Among the metal carbonates and metal carbonyls, which is an organometallic compound and why?
18.  $[\text{V}(\text{CO})_6]$  is readily reduced to  $[\text{V}(\text{CO})_6]^-$  Why?
19. Give a brief description of oxyacids of phosphorus.
20. What are inorganic polymers? Give an example.
21. Explain the structure of  $[\text{Co}_2(\text{CO})_8]$ .
22. What are inter halogen compounds? Give an example.

**(8 × 2 = 16 Marks)**

## SECTION – C

Short essay type. Answer **any six** questions. Each question carries **4** marks.

23. Discuss the applications of spectrophotometry.
24. Explain the structural changes of haemoglobin during oxygenation and deoxygenation.

25. Describe the preparation, properties and uses of  $\text{TiCl}_4$ .
26. What are the factors affecting the stability of metal complexes. Explain.
27. Discuss the manufacture of glass.
28. Explain the separation of lanthanide elements from monazite.
29. Write a short note on the nanosystems found in nature.
30. What are the postulates of VBT of complexes? What are its demerits?
31. What is lanthanide contraction? Explain its causes and consequences.

**(6 × 4 = 24 Marks)**

#### SECTION – D

Answer **any two** questions. Each question carries **15** marks.

32. Discuss the instrumentation and applications of
  - (a) TG
  - (b) DTA
  - (c) Flame emission spectroscopy.
33. Discuss the stereo isomerism exhibited by coordination compounds with suitable examples.
34. Discuss :
  - (a) Classification of organometallic compounds.
  - (b) Preparation and properties of  $[\text{Ni}(\text{CO})_4]$
35. Discuss the various methods for the preparation of nanoparticles.

**(2 × 15 = 30 Marks)**

(Pages : 3)

**M – 2658**

Reg. No. : .....

Name : .....

**Second Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology Multimajor**

**BV 1245 : MICROBIOLOGY**

**(2014-2018 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

I. Answer **all** questions in **one** or **two** sentences. **Each** question carries **1** mark.

1. What is a prophage?
2. Who discovered Penicillin?
3. What is Pasteurization?
4. Explain symbiosis.
5. Virus that attack bacteria.
6. Causative organism of Typhoid.
7. What are extremophiles? Give an example.
8. What is an F factor?
9. RNA viruses are called \_\_\_\_\_ Give one example of RNA virus.
10. Which microbe is involved in acetic acid fermentation?

**(10 × 1 = 10 Marks)**

P.T.O.

## SECTION – B

- II. Answer any **eight** questions not exceeding a paragraph. **Each** question carries **2** marks.
11. Write note on various types of Plasmids in bacteria
  12. List out the similarities and differences between temperate phages and virulent phages.
  13. Comment on methanogenic bacteria.
  14. Name the causative organism of the following diseases
    - (a) Cholera
    - (b) Tetanus
    - (c) Tuberculosis
    - (d) Influenza
  15. SCP
  16. Bacterial classification based on flagella types.
  17. Differentiate between slant culture and stab culture.
  18. Characteristics used for classification of virus
  19. Name the causative organism and pathogenesis of Polio.
  20. Explain bacterial growth curve.
  21. Mycoplasma
  22. Write note on the physical agents used for control of microorganisms.

**(8 × 2 = 16 Marks)**

## SECTION – C

- III. Answer any **six** questions. **Each** question carries **4** marks.
23. Comment on nutritional types of bacteria.
  24. Compare and contrast antiseptics and disinfection.

25. Explain the various processes of isolating auxotrophs.
26. Give an account of different types of bacterial pure culture techniques.
27. What is Nitrogen fixation? Explain the various types of nitrogen fixation procedure.
28. Explain the methods by which genetic recombination take place in bacteria.
29. Write short note on sterilization procedures.
30. Explain oxidative phosphorylation in bacteria.
31. Describe the role of bacteria in medicine.

**(6 × 4 = 24 Marks)**

SECTION – D

IV. Answer any **two** questions. **Each** question carries **15** marks.

32. Differentiate between gram positive and gram negative bacteria with respect to the structure of the cell wall. Add note on the gram staining procedure.
33. Write an essay on the application of bacterial metabolism in industry.
34. With suitable illustration explain the structure and multiplication of bacteriophage. Bacteriophage effect genetic transformation in bacteria. Justify the statement.
35. In detail explain the methods of strain improvement in industrial microorganisms used for fermentation.

**(2 × 15 = 30 Marks)**

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(Pages : 3)

**M – 2659**

Reg. No. : .....

Name : .....

**Second Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**Complementary Course II**

**Common for BV 1231.1 : ANIMAL PHYSIOLOGY (2015 TO 2018 Admission)  
& ANIMAL PHYSIOLOGY AND ANATOMY (2019 Admission)**

**(for Botany, Chemistry and Biotechnology)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions in **one** or **two** sentences. **Each** question carries **1** mark.

1. What is an angiogram?
2. What is balanced diet?
3. List the endocrine cells of pancreas and their secretions.
4. Write the role of dietary fiber in human nutrition.
5. What are Nissl's bodies?
6. Name any four vitamins belonging to B complex and write their chemical names.
7. Name the Phospholipids of myeline sheath.
8. Comment on phosphagens

P.T.O.

9. What is latent period in a muscle twitch?
10. What is rigor mortis?

**(10 × 1 = 10 Marks)**

SECTION – B

Answer any **eight** questions, not exceeding a paragraph. **Each** question carries **2** marks.

11. Explain Bohr effect.
12. Give a brief note on malnutrition disorders.
13. Describe physiological effects of smoking.
14. Write note on ECG.
15. Give an account on arteriosclerosis.
16. What do you mean by anticoagulants? Give examples.
17. Explain Hamburger phenomenon.
18. Comment on neurogenic heart.
19. Explain saltatory transmission.
20. Write on Sodium pump.
21. Give an account on hormones of adrenal gland.
22. What is corpus luteum? What is its function?

**(8 × 2 = 16 Marks)**

SECTION – C

Answer any **six** questions. **Each** question carries **4** marks.

23. Write on Carbon dioxide transport.
24. Explain properties of skeletal muscles.
25. Give an account on respiratory disturbances

26. Comment on hormonal regulation of kidney function.
27. Comment on the respiratory pigments in various organisms. Write their functions.
28. Comment on the functions of plasma proteins.
29. Write on dialysis.
30. Write on the transmission of impulse through a nerve.
31. Describe different types of muscle cells.

**(6 × 4 = 24 Marks)**

SECTION – D

Answer any **two** questions. **Each** question carries **15** marks.

32. Write an essay on physiology of urine formation.
33. Write a detailed account on the extrinsic and intrinsic mechanisms of blood coagulation.
34. Describe the regulation of respiration.
35. Give an account on the hormonal disorders in man.

**(2 × 15 = 30 Marks)**

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(Pages : 3)

**M – 2660**

**Reg. No. :** .....

**Name :** .....

**Second Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme Under CBCSS**

**Group 2(b) – Biotechnology (Multimajor)**

**Core Course – II**

**BV 1241.2 — ENVIRONMENTAL STUDIES**

**(For Zoology, Chemistry and Biotechnology)**

**(2015 to 2018 Admission)**

Time : 3 Hours

Max. Marks : 80

I. Answer **all** questions with **one** or **two** sentences. **Each** question carries 1 mark. Draw diagrams only if specified in the question.

1. Consumers
2. Habitat
3. Food web
4. Population
5. Biosphere
6. Decomposers
7. Autecology
8. Transformers
9. Estuary
10. Mangrove

**(10 × 1 = 10 Marks)**

P.T.O.

II. Answer **any eight** questions. **Each** question carries **2** marks and answer should not exceed **one** paragraph.

11. Comment on Shelford's law of tolerance.
12. Comment on the food chain.
13. Write a note on Afforestation.
14. Differentiate between Natality and Mortality.
15. Write a note on Grasslands.
16. What is Eulittoral zone?
17. Differentiate between Lentic and Lotic zones.
18. Describe Gause's exclusion principle.
19. What is density-dependant population regulation?
20. Give the artic Tundra.
21. What is dominance?
22. Give the concept of biomes.

**(8 × 2 = 16 Marks)**

III. Answer any six questions. **Each** question carries **4** marks. Answer should not exceed **120** words.

23. Describe the types of Ecological pyramids.
24. Differentiate between Autotrophs and Heterotrophs.
25. Describe the gaseous cycle with example.
26. Describe Global warming.
27. Differentiate between food chain and food web.
28. Write note on non-renewable energy.
29. Explain the role of light as limiting factor.
30. Write a note on terrestrial habitat.
31. Explain J-shaped curve.

**(6 × 4 = 24 Marks)**

IV. Answer **any two** questions. (Not more than **three** pages). **Each** question carries **15** marks.

32. Write an essay on the Biotic and Abiotic components of ecosystem.

33. Write an essay on the energy flow in ecosystem and the laws of thermodynamics.

34. Write an essay on the biosphere reserves.

35. Write an essay on Marine ecosystems.

**(2 × 15 = 30 Marks)**

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(Pages : 3)

**M – 2661**

**Reg. No. :** .....

**Name :** .....

**Second Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme under CBCSS**

**Group 2 (b) Biotechnology (Multimajor)**

**BV 1221 : BIOPHYSICS AND INSTRUMENTATION**

**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions in a word or **one** or **two** sentences. **Each** question carries **1** mark.

1. State the first law of thermodynamics.
2. What is an audiometer?
3. Define blind spot of the eye.
4. What are non ionizing radiations?
5. Define isotopes. Give an example.
6. What is bisacrylamide?
7. Mention the use of SDS in PAGE.
8. What is electrochemical gradient?

**P.T.O.**

9. State Beer Lamberts law.
10. What is exothermic reaction.

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks (answer not to exceed one paragraph).

11. Which are the types of IR radiations.
12. What is the principle of manometry?
13. Which organs form the lens system of the eye?
14. What is radiotracer technique?
15. State the principle of SEM?
16. What is an ionic bond?
17. Differentiate between absorption spectra and action spectra?
18. Give the principle of phase contrast microscopy.
19. What is meant by hearing aid? Give an example.
20. What is Gibbs free energy?
21. Write the principle of polarography.
22. What are the heat conservation methods in biological systems?

**(8 × 2 = 16 Marks)**

### SECTION – C

Answer any **six** questions. **Each** question carries **4** marks ( Answer not to exceed 120 words)

23. Comment on the uses of fluorimetry.
24. What is membrane potential? State its significance.
25. Explain the various types of molecular interactions?



26. Comment on the resonant energy transfer in photosynthetic pigments.
27. Describe the muscular movements helpful in hearing.
28. Describe light reception in microbes.
29. Explain the working of a pH meter.
30. What is Atomic absorption spectroscopy.
31. Explain the different types of vision faults.

**(6 × 4 = 24 Marks)**

SECTION – D

Answer any **two** questions. **Each** question carries **15** marks (Answer not to exceed three pages).

32. Define electrophoresis? Explain its types.
33. Describe electron microscopy and its applications.
34. How ATP synthesis is explained through chemiosmotic coupling?
35. Explain the principle and working of mass spectrometry.

**(2 × 15 = 30 Marks)**

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(Pages : 3)

**M – 2662**

Reg. No. : .....

Name : .....

**Second Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme under CBCSS**

**Group 2 (b) Biotechnology (Multimajor)**

**Complementary Course**

**BV 1231.2 : PLANT PHYSIOLOGY, ANGIOSPERM ANATOMY AND  
REPRODUCTIVE BOTANY**

**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions in a word or **one** or **two** sentences. **Each** question carries **1** mark.

1. What are companion cells?
2. Give one example for monosporic embryo.
3. Define bulliform cells.
4. Name the living tissue involved in translocation of solutes.
5. Define imbibition.
6. What is stomium?
7. Define apical cell theory.

**P.T.O.**

8. What is hill reaction?
9. What are hydathodes?
10. What is triple fusion?

**(10 × 1 = 10 Marks)**

SECTION – B

Answer any **eight** questions. **Each** question carries **2** mark. (Answer not to exceed one paragraph)

11. What is the relevance of diffusion in plants?
12. What is the importance of vernalization in plants?
13. Explain histogen theory.
14. Differentiate between transpiration and guttation.
15. Differentiate heart wood from sap wood.
16. Explain double fertilization.
17. Explain Munch mass flow hypothesis.
18. Describe endothecium.
19. Write a note on anti-transpirants and their significance.
20. Differentiate T-tapetum from C-tapetum.
21. Explain periderm formation in plants.
22. Describe the structure of thylakoids.

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions. **Each** question carries **4** marks (Answer should not exceed 120 words).

23. Describe cyclic photophosphorylation in plants.
24. With the help of a labelled diagram describe the structure of dicot embryo.
25. With the help of diagram describe the anatomy of dicot leaf.
26. Explain how and why leaves of Mimosa are sensitive to touch?
27. Explain Blackman's law of limiting factors.
28. Enumerate the role of cambium in budding.
29. Define fertilization. Write note on barriers of fertilization.
30. What is the importance of photoperiods in plants? Explain how plants are classified based on their photoperiods?
31. With the help of labelled diagram explain the structure of anther.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. **Each** question carries **15** marks (Answer not to exceed three pages)

32. Write a detailed account on the physiological role of plant growth regulators.
33. Give a detailed account of the process of dark reaction in photosynthesis.
34. Define meristems. What are their characteristic features? Explain the various types of meristems seen in plants.
35. Explain different types of embryosacs with suitable diagrams.

**(2 × 15 = 30 Marks)**

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**M – 2663**

Reg. No. : .....

Name : .....

**Second Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**BV 1241.1 : ENVIRONMENTAL STUDIES**

**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions in a word or **one** or **two** sentences. **Each** question carries **1** mark.

1. What type of resource is solar energy?
2. Define non-renewable resource.
3. Define food web.
4. What is habitat loss?
5. Define conservation.
6. Describe eco-types.
7. What is the significance of vermicomposting?
8. Give the generic name of any two mangrove plants of Kerala.
9. State one reason for landslide.
10. Give one characteristic feature of the trees living in a shola forest.

**(10 × 1 = 10 Marks)**

P.T.O.

## SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks. (Answer not to exceed one paragraph)

11. What are the implications of over exploitation of mineral resources?
12. What are the main causes of earthquake?
13. What is the consequence of grazing?
14. What is meant by energy flow in an ecosystem?
15. Write short notes on hotspots.
16. Write down two epiphytic adaptations.
17. Explain any two aspects of disaster risk reduction.
18. Write short notes on acid rain.
19. What causes greenhouse effect?
20. What are the important characteristic features of mangrove forest?
21. Describe any two manmade hazards?
22. Write short notes on scrub jungle?

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions. **Each** question carries **4** marks. Answer not to exceed **120** words

23. What are the negative impacts of modern agriculture?
24. Write an account on ecological pyramids.
25. Describe grassland as an ecosystem.

26. Write on the threats to Biodiversity.
27. Describe the morphological and anatomical adaptation of hydrophytes.
28. Write on the various aspects of marine pollution.
29. Write short account on the following.
  - (a) rain water harvesting
  - (b) Water shed management
30. Write on the wildlife protection act.
31. What is the influence of forest and social forestry on environment?

**(6 × 4 = 24 Marks)**

SECTION – D

Answer any **two** questions. **Each** question carries **15** marks. Answer not to exceed three pages.

32. Describe forest as an ecosystem.
33. Write on the causes, effect and control of air pollution.
34. Write on the various aspects of environmental ethics.
35. Discuss the following. 1 Endangered and endemic species, 2. In-situ and Ex- situ conservation, 3.National parks and wildlife sanctuaries.

**(2 × 15 = 30 Marks)**

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(Pages : 3)

**M – 2664**

Reg. No. : .....

Name : .....

**Second Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology Multimajor**

**BV 1245 : MICROBIOLOGY**

**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions in a word or **one** or **two** sentences. **Each** question carries **1** mark.

1. Who proposed the germ theory of diseases?
2. Name an ionizing radiation method used for sterilization.
3. Mention any two locomotor organs in bacteria.
4. Give an example of a gram negative bacteria.
5. Which life-cycle is characterized by the integration of the bacteriophage into the host bacterium's genome?
6. What is chemotaxis of bacteria?
7. Define a plasmid.
8. Define transduction.
9. Name the causative organism of tuberculosis.
10. Name a soil-borne bacterial disease.

**(10 × 1 = 10 Marks)**

P.T.O.



## SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks. (Answer not to exceed **one** paragraph)

11. Which are the different types of bacterial culture medium?
12. Write a note on three kingdom classification system.
13. Define lytic cycle.
14. Name the three basic parts of a bacterial flagellum.
15. What is a heterotrophic organism?
16. Why the citric acid cycle also known as TCA cycle?
17. What are methanogens; give one example.
18. What is induced mutation? Give example.
19. What are thermophiles and cite one example.
20. Briefly write on the role of bacteria in phosphorus cycle.
21. Briefly explain botulism.
22. Name the causative organisms of
  - (a) Rubella and
  - (b) Yellow fever.

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions. **Each** question carries **4** marks. (Answer not to exceed **120** words)

23. Discuss the different methods for sterilization.
24. Write briefly on the nutritional classification of bacteria.
25. Explain the lysogenic cycle of a phage.
26. Give an account of the different plating techniques for the isolation of pure cultures.
27. Differentiate between saprophytes and parasites with examples.

28. Explain the process of oxidative phosphorylation in bacteria.
29. Write a note on the role of bacteria in nitrogen cycle.
30. Write briefly on pneumotropic viral diseases.
31. Give an account on replica plating.

**(6 × 4 = 24 Marks)**

SECTION – D

Answer any **two** questions. **Each** question carries **15** marks. (Answer not to exceed **three** pages)

32. Explain the bacterial growth curve. What are the different factors that affects bacterial growth?
33. Explain the process of anaerobic respiration with respect to alcohol fermentation by yeast and bacteria.
34. Elaborate the methods of genetic recombination in bacteria.
35. Write an essay on any three air-borne bacterial diseases that affect human.

**(2 × 15 = 30 Marks)**

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(Pages : 3)

**M – 2665**

Reg. No. : .....

Name : .....

**Second Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**Complementary Course II**

**BV 1231.1 : ANIMAL PHYSIOLOGY AND ANATOMY**

**(for Botany, Chemistry and Biotechnology)**

**(2020 Admission Regular)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions in a word or **one** or **two** sentence. **Each** question carries **1** mark. Draw diagram only if specified in the questions.

1. What is ACh?
2. Components of an adequate diet. —
3. What is autotrophy?
4. Give two examples of respiratory pigment.
5. What is meant by myogenic heart?
6. Cite an example of uricotelic animal.
7. Define a synapse.
8. What are leucocytes?

**P.T.O.**

9. Define asphyxia.
10. What is plasmin?

**(10 × 1 = 10 Marks)**

SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks. Answer not to exceed **one** paragraph.

11. What is blood pressure?
12. Define proteinuria.
13. Comment on rigor moris.
14. What is diabetes mellitus?
15. Explain cardiac muscle.
16. Define thrombosis.
17. What is dialysis?
18. What is meant by feed back?
19. Comment on pulse.
20. Point out two kidney disorders.
21. What is plasma?
22. Explain the composition of urine.
23. Mention two vitamin deficiency diseases
24. Comment on “Rhesus factor”.
25. Define selective reabsorption.
26. Comment on ECG.

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions. **Each** question carries **4** marks. Answer not to exceed **120** words.

27. Give an account on carbon monoxide poisoning.
28. Describe the different types of heart.
29. Comment on angioplasty.
30. Sketch and label the structure of a neuron.
31. Discuss the mechanism of blood clotting.
32. Write an account on hypothalamus hormone.
33. Comment on pacemakers.
34. Discuss the phenomenon of ultra filtration.
35. Give an account on summation
36. Comment on respiratory pigments.
37. Give an account on muscle proteins.
38. List out the various endocrine glands of man.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. (Not more than **three** pages) **Each** question carries **15** marks.

39. Give an account on the origin and propagation of nerve impulse across a synapse.
40. Describe the over all summary of blood function.
41. Give an account on cardio vascular disease.
42. Describe the process of urine formation in man.
43. Write an essay on major respiratory disturbances and diseases.
44. Give an account on hormonal disorders in man.

**(2 × 15 = 30 Marks)**

(Pages : 3)

**M – 2666**

Reg. No. : .....

Name : .....

**Second Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) – Biotechnology (Multimajor)**

**BV 1231.2 : PLANT PHYSIOLOGY, ANGIOSPERM ANATOMY AND  
REPRODUCTIVE BOTANY**

**(2020 Admission Regular)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** the questions in a word or sentences. **Each** question carries **1** mark.

1. Define diffusion.
2. Name a simple tissue.
3. What is exosmosis.
4. What is a pollinia?
5. Define fluorescence.
6. What is secondary meristem?
7. What is apical dominance?
8. Mention the function of root cap.
9. What is sap wood?
10. What is an exarch xylem?

**(10 × 1 = 10 Marks)**

P.T.O.

## SECTION – B

Answer any **eight** questions not to exceed a paragraph. **Each** question carries **2** marks.

11. What is parthenocarpy?
12. Explain the process of fertilization.
13. Comment on the physiological significance of water stress.
14. What is cork cambium? Mention its role.
15. Comment on anti-transpirants.
16. Mention the functions of chloroplast.
17. What is stelar secondary thickening?
18. Comment on growth curve.
19. Point out the salient features of C<sub>3</sub> plants.
20. What are bulliform cells? Give example.
21. Explain Tunica- corpus theory.
22. What are photosynthetic pigments?
23. Write short note on photoperiodism.
24. Comment on bacterial photosynthesis.
25. What is meant by senescence?
26. Comment on the role of lenticels.

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions. Answer not to exceed **120** words. **Each** question carries **4** marks.

27. Give a brief account on transpiration.
28. Describe the structure of *Polygonum* type of embryosac.
29. What is plasmolysis? Comment on its significance.
30. Give a brief account on the structure and function of xylem.

31. Comment on secretory tissues.
32. Describe the mechanism of phloem transport.
33. Explain different types of vascular arrangements.
34. Write a brief account on ascent of sap.
35. Mention the scope of plant anatomy.
36. Write brief note on ring porous and diffuse porous wood.
37. Give a brief account on water absorption.
38. Describe the structure of a monocot leaf.

**(6 × 4 = 24 Marks)**

SECTION – D

Answer any **two** questions. Answer not to exceed **three** pages. **Each** question carries **15** marks.

39. What are growth hormones? Give an account on various growth hormones and its function.
40. Describe the anomalous secondary thickening in *Boerhaavia*. Draw neat diagram.
41. What is light reaction? Explain in detail the mechanism of cyclic and non cyclic photophosphorylation.
42. Describe the structure of a mature anther. Add details on microsporogenesis.
43. Explain **C<sub>4</sub>** pathway of carbon assimilation and add details on factors affecting photosynthesis.
44. Describe the secondary thickening in dicot root. Draw neat diagram.

**(2 × 15 = 30 Marks)**

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(Pages : 4)

M – 2668

Reg. No. : .....

Name : .....

**Second Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme under CBCSS**

**Group 2 (b) : Biotechnology Multimajor**

**BV 1243 : INORGANIC CHEMISTRY – II**

**(2020 Admission Regular)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

(Answer **all** questions. Each question carries **1** mark.)

1. Transition elements are \_\_\_\_\_ electropositive than alkaline earth metals.
2. All the lanthanides in III state except \_\_\_\_\_ are coloured.
3. Vitamin B<sub>12</sub> is a \_\_\_\_\_ chelate.
4. The colour of transition metal compounds are due to \_\_\_\_\_.
5. Potassium trichloro(ethylene)Platinate(II) is commonly known as \_\_\_\_\_.
6. \_\_\_\_\_ are amorphous solids.
7. The most widely used flame in AAS is \_\_\_\_\_.
8. \_\_\_\_\_ gas is purged during Thermogravimetric Analysis.
9. \_\_\_\_\_ is an example of a top-down approach for synthesis of nanomaterials.
10. The title of Richard Feynman's famous observation of nanotechnology is \_\_\_\_\_.

**(10 × 1 = 10 Marks)**

P.T.O.

## SECTION – B

(Answer **any eight** questions. Each question carries **2** marks)

11. What are the general characteristics of transition elements?
12. Why do transition metals have more oxidation states than other elements?
13. Why the lower oxidation states less important for actinides compared to that of lanthanides?
14. Discuss Sidgwick's effective number rule.
15. What is the significance of coordination number?
16. What is crystal field stabilization energy?
17. What are organometallic compounds?
18. What is the role of calcium in blood clotting?
19. Discuss the bonding in Bis(benzene)chromium.
20. What are the various types of glasses?
21. What are the industrial applications of borazole?
22. Why source modulation is used in AAS?
23. What is the advantages of plasma source over flame source in emission spectroscopy?
24. Why are the applications of TGA more limited than those for DSC?
25. What are the unique properties of nanomaterials?
26. What are the potential applications of nanoparticles?

**(8 × 2 = 16 Marks)**

## SECTION – C

(Answer **any six** questions. Each question carries **4** marks)

27. Discuss the origin and characteristics of the colours of the transition element ions.
28. What is lanthanide contraction? Discuss its consequences.
29. What are the postulates of Werner's coordination theory?
30. What are the characteristics of coordination compounds?
31. Discuss the mechanism of action of hemoglobin.
32. Discuss the role of Iron in biological systems.
33. What are silicates? What are their uses?
34. Distinguish between interhalogen compounds and pseudohalogen compounds.
35. Discuss the factors that affect the sensitivity of a flame emission spectrum.
36. Draw a typical DSC thermogram and explain nature of peaks.
37. Discuss the importances of Faraday's divided metal concept.
38. Discuss the high energy milling technique for nanoparticle synthesis. What are its demerits?

**(6 × 4 = 24 Marks)**

## SECTION – D

(Answer **any two** questions Each question carries **15** marks)

39. (a) Explain the spectral properties of the transition elements.  
(b) Explain the uses of lanthanides and actinides.

40. (a) Explain the molecular orbital theory of coordination compounds.  
(b) Explain the various types of isomerism in coordination compounds.
41. (a) Explain the various steps involved in sodium potassium pump.  
(b) Explain the biochemistry of Magnesium.
42. (a) Explain the structure and industrial applications of boron hydride.  
(b) Explain the structure, properties and uses of Strides.
43. (a) Explain the instrumentation, sampling and applications of atomic absorption spectroscopy.  
(b) By taking the example of calcium oxalate, explain the graphical representation of thermogravimetric analysis.
44. (a) Give a brief account of the nanosystems find in nature.  
(b) Compare the advantages and disadvantages of colloid precipitation and coprecipitation methods for nanoparticle synthesis.

**(2 × 15 = 30 Marks)**

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(Pages : 4)

**M – 2669**

**Reg. No. :** .....

**Name :** .....

**Second Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**BV 1241.1 ENVIRONMENTAL STUDIES**

**(2020 Admission Regular)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** the questions in a word or one or two sentences. Each question carries **1** mark.

Define the following :

1. What are deciduous forests?
2. Define producers.
3. What is a pollutant?
4. What is an ecological niche?
5. Define an environment.
6. What is global warming?
7. What is deforestation?

**P.T.O.**

8. Define holocaust.
9. What are ecological indicators?
10. What is food Web?

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer **any eight** questions. Each question carries **2** marks. Answer not to exceed **one** paragraph.

11. Write short notes on ecological succession.
12. Comment on thermal pollution.
13. What are renewable resources?
14. Give a brief account on food chain.
15. What are endemic species?
16. Mention various methods of water conservation.
17. Comment on hotspots of biodiversity.
18. What is a mega diversity nation?
19. Give the salient features of shola forests.
20. Point out the harmful effects of modern agriculture.
21. What are wildlife sanctuaries?
22. Write short notes on sustainable development.
23. What are ecotypes?

24. What is meant by *in situ* conservation?
25. Write short notes on desertification.
26. Comment on land degradation.

**(8 × 2 = 16 Marks)**

### SECTION – C

Answer **any six** questions. Each question carries **4** marks. Answer not to exceed **120** words.

27. What are hydrophytes? Comment on their adaptations.
28. Explain Forest Conservation Act.
29. Write a brief account on ecological pyramids.
30. Distinguish between renewable and non renewable energy resources.
31. Write notes on the importance of mangrove forests.
32. Give a brief account of soil erosion.
33. Explain the role of National parks in biodiversity conservation.
34. Give a brief account of social forestry.
35. Write an account on solid waste management.
36. Explain the importance of forest resources.
37. What are Hazards? Give an account on types of hazards.
38. Give an account on grassland ecosystems.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer **any two** questions. Each question carries **15** marks. Answer not to exceed **3** pages.

39. What are natural resources? Give a detailed account on mineral resources.
40. Give a detailed account on air pollution, its causes, effects and control measures.
41. Write an account on biodiversity, its types, values and threats.
42. Describe the structure of an ecosystem. Add details on different types of ecosystem.
43. Write an account on phytogeography and phytogeographical regions of India.
44. What are xerophytes? Give an account on their salient features and adaptations.

**(2 × 15 = 30 Marks)**

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(Pages : 4)

**M – 2670**

**Reg. No. :** .....

**Name :** .....

**Second Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme under CBCSS**

**Group 2 (b) Biotechnology Multimajor**

**BV 1245 : MICROBIOLOGY**

**(2020 Admission Regular)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions in **a word** or **one** or **two** sentences. **Each** question carries **1** mark.

1. Define sterilization.
2. What is the key difference between a bacteria and mycoplasma?
3. What is bacterial strain?
4. Name any two factors that affect the growth of bacteria.
5. Which life cycle of the bacteriophage results in the destruction of the host cell?
6. Where does oxidative phosphorylation occurs in bacteria?
7. Name a bacteria involved in fermentation of acetic acid.
8. What are Col plasmids?

**P.T.O.**

9. Name a nitrogen fixing bacteria.
10. Name one neurotropic viral disease.

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks. (Answer not to exceed **one** paragraph)

11. Write a brief note on Pasteur's experiments.
12. Define lysogenic cycle.
13. What is an autotrophic organism?
14. Why the citric acid cycle also known as TCA cycle?
15. Comment on SCP.
16. Briefly explain botulism.
17. What causes Diphtheria and how it is prevented?
18. What are the three domain classification proposed by Woese?
19. Define symbiosis and state its importance.
20. Name any two types of bacterial culture media.
21. What are the four stages of bacterial growth curve?
22. What are alkaliphilic bacteria?
23. What is fertility factor?
24. What is meant by pure culture?
25. Name any two industrially important products of fermentation.
26. What is recombinant DNA technology?

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions. **Each** question carries **4** marks. (Answer not to exceed **120** words)

27. Give a detailed account of the bacterial flagella and its structure.
28. What is transformation? Explain the Griffith's experiment.
29. Explain the process of bacterial conjugation.
30. Write a note on replica plating technique.
31. Explain electron transport and oxidative phosphorylation in bacteria.
32. Write a note on any three dermatoviral diseases; its causative organisms and symptoms.
33. Give an account on agents that can be used to control microbes.
34. Elaborate on culture techniques of anaerobic bacteria.
35. Write a brief note on structure of a T4 bacteriophage with diagram.
36. Discuss the production of antibiotics by fermentation process.
37. Elaborate any two soil borne bacterial infections.
38. Write on any three food or water-borne infections to humans.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. **Each** question carries **15** marks. (Answer not to exceed 3 pages)

39. Define sterilization and discuss various methods used for sterilization.
40. Elaborate on bacterial culture media its types and uses. Schematically represent the bacterial growth curve.

41. Explain the role of microorganisms in nitrogen, carbon, phosphorus and sulphur cycles.
42. What are the characteristics of a phage particle? With suitable diagrams, elaborate on the lifecycle of a bacteriophage.
43. Write an essay on any three air-borne bacterial diseases that affect human.
44. What are the important Pneumotropic infections that affect humans? Write on the causative organisms and symptoms.

**(2 × 15 = 30 Marks)**

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(Pages : 4)

N – 2866

Reg. No. : .....

Name : .....

**Third Semester B.Sc. Degree Examination, March 2022**

**Career Related First Degree Programme Under CBCSS**

**Group 2(b) – Biotechnology (Multimajor)**

**Core Course V**

**BV 1343 : PHYSICAL CHEMISTRY I**

**(2013 – 2018 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. Each question carries 1 mark.

1. The deviation of real gas from ideal gas behavior is described by \_\_\_\_\_.
2. Collision frequency is the \_\_\_\_\_ at which two reactants collide in the given system.
3. Normality is the number of mole equivalents dissolved in \_\_\_\_\_ of solution.
4. Two solutions having the same \_\_\_\_\_ across a semipermeable membrane is referred to as isotonic solution.
5. \_\_\_\_\_ is a measure of the pressure of a gas in comparison to ideal gas.
6. Chemiluminescence is the generation of \_\_\_\_\_ as light by the release of energy from a chemical reaction.

P.T.O.

7. Decomposition of nitrogen dioxide is an example of a \_\_\_\_\_ order reaction.
8. Smectic liquid crystals are \_\_\_\_\_ more ordered than nematic liquid crystals.
9. The fraction of the total salt which is hydrolysed at equilibrium is called \_\_\_\_\_.
10. The strength of a strong base is leveled by the \_\_\_\_\_ of the solvent.

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer any **eight** questions. Each question carries **2** marks.

11. A beam of X-rays of wavelength 0.071 nm is diffracted by (110) plane of rock salt with lattice constant of 0.28 nm. Find the glancing angle for the second-order diffraction.
12. What is the importance of van der Waals equation?
13. What is the effect of temperature on most probable velocity?
14. How many kJ need to be removed from a 120.0 g sample of water, initially at 25.0°C, in order to freeze it at 0°C.
15. Why Carnot cycle is important?
16. What is meant by differential enthalpy of solution?
17. State two quantities that must be measured to establish the rate of a chemical reaction and cite several factors that affect the rate of a chemical reaction.
18. What plot of experimental data can be used to evaluate the activation energy,  $E_a$  of a reaction? How is  $E_a$  related to this plot?
19. What are the significances of point groups?
20. What are nematic liquid crystals?

21. What is meant by reaction isotherm?
22. What is ionization constant?

**(8 × 2 = 16 Marks)**

### SECTION – C

Answer any **six** questions. Each question carries **4** marks.

23. For 1.00 mole of a particular gas, the average molecular energy is found to be  $1.300 \text{ kJ mol}^{-1}$  at 298 K. Approximately, how many molecules have at least five times the average molecular kinetic energy.
24. Discuss the X-ray diffraction studies of crystals.
25. Discuss the Beckmann method of determination of molecular mass of a solute.
26. Discuss the Joule - Thomson effect and its significance.
27. Explain the Hess's law and its application.
28. Make comparative studies of fluorescence and phosphorescence.
29. Rate constants for the first-order decomposition of acetonedicarboxylic acid  
 $\text{CO}(\text{CH}_2\text{COOH})_2(\text{aq}) \rightarrow \text{CO}(\text{CH}_3)_2(\text{aq}) + 2\text{CO}_2(\text{g})$  are  $k = 4.75 \times 10^{-4} \text{ s}^{-1}$  at 293 K and  $k = 1.63 \times 10^{-3}$  at 303 K. What is the activation energy,  $E_a$  for this reaction?
30. Explain the various applications of liquid crystals.
31. Discuss the hydrolysis of salts of strong acid and weak base.

**(6 × 4 = 24 Marks)**

### SECTION – D

Answer any **two** questions. Each question carries **15** marks.

32. Explain the various types of molecular velocities. How are they related?
33. Explain the methods used for the determination of viscosity of a liquid.

34. Derive the rate equation for a second order reaction based on collision theory.

35. Explain the phase equilibria of

(a) Decomposition of  $\text{CaCO}_3$  system and

(b)  $\text{Na}_2\text{SO}_4 - \text{H}_2\text{O}$  system.

**(2 × 15 = 30 Marks)**

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(Pages : 3)

**N – 2868**

**Reg. No. :** .....

**Name :** .....

**Third Semester B.Sc. Degree Examination, March 2022.**

**Career Related First Degree Programme under CBCSS**

**Group 2 (b) – Biotechnology (Multimajor)**

**Core Course – IV**

**BV 1344 – FOOD AND INDUSTRIAL BIOTECHNOLOGY**

**(2015 – 2018 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions in a **word** or **one** of **two** sentences. Each carries **1** mark.

1. Name a microorganism used in the production of antibiotics.
2. Name an industrially important fermentation product of bacteria.
3. Define fermentation.
4. What is a bioreactor?
5. What is the function of an agitator in a fermenter?
6. Name a method for the sterilization of fermentation media.
7. What you mean by the downstream processing of fermentation?
8. Give one common use of immobilized enzymes.

**P.T.O.**

9. Name any one mycotoxin.
10. Who invented pasteurization?

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer **any eight** questions. Answer not to exceed one paragraph. Each carries **2** marks.

11. What are the three different kinds of fermentation?
12. Name the important components of a bioreactor.
13. Enlist the important chemical composition of an ideal production media.
14. Write briefly on batch fermentation.
15. What are the physical methods for the separation of fermentation products?
16. What you mean by solid state fermentation?
17. Enlist the important advantages of immobilized enzymes.
18. Give one example each of a primary metabolite and a secondary metabolite produced by micro organisms.
19. What you mean by food intoxication?
20. Give two examples of natural food preservatives.
21. Name any two common food-borne disease causing microorganisms.
22. Mention the different steps involved in industrial cheese making.

**(8 × 2 = 16 Marks)**

### SECTION – C

Answer **any six** questions. Answer not to exceed half page. Each carries **4** marks.

23. Write a note on industrially important fermentation products.
24. Brief on the different primary screening methods to screen and isolate industrially important microorganisms.

25. What are the different types of bioreactors?
26. Explain the process of pasteurization and its importance in dairy industry.
27. What are the important applications of single cell protein?
28. Write a note on the microbial production of protease and amylase.
29. Differentiate between food contamination and food spoilage.
30. Write a note on the hazardous effects of food spoilage.
31. Explain the industrial production of beer.

**(6 × 4 = 24 Marks)**

#### SECTION – D

Answer **any two** questions. Answer not to exceed three pages.

32. Elaborate on the microbial production of Glutamic acid and Citric acid.
33. Write an essay on the production of vitaminB12 and antibiotic penicillin.
34. Explain the sequential steps involved in downstream processing the fermentation product recovery.
35. Describe the different physical and chemical methods for the separation of fermentation process.

**(2 × 15 = 30 Marks)**

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(Pages : 3)

**N – 2870**

Reg. No. : .....

Name : .....

**Third Semester B.Sc. Degree Examination, March 2022.**

**Career related First Degree Programme under CBCSS**

**Group 2(b) – Biotechnology (Multimajor)**

**Complementary Course – III**

**BV 1331.1 – DEVELOPMENTAL BIOLOGY, HUMAN GENETICS AND  
ANIMAL BEHAVIOUR**

**(For Botany, Chemistry & Biotechnology)**

**(2015 – 2018 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** the questions in one word or two sentences. Each question carries **1** mark.

1. What are Telolecithal Eggs?
2. What are alleles?
3. What is involution?
4. What are the demerits of social groups?
5. Comment on stimulus
6. What do you mean by Mendelian Traits?
7. Which are human pheromones?

**P.T.O.**

8. What is ideogram?
9. Why p53 is known as the guardian of the genome?
10. What is acrosome reaction?

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer **any eight** questions. Each question carries **2** marks. (Answer should not exceed one paragraph)

11. What do you mean by organisers?
12. Write note on delamination
13. What are autosomes?
14. Explain ABO blood group inheritance
15. Comment on eugenics
16. Write note on tumour suppressor genes
17. What do you understand by Lyon's hypothesis?
18. Comment on stimulus filtering
19. Write note on the characteristics of instinctive behaviour
20. What is fixed action pattern?
21. Explain the process of blastulation
22. Why Sickle cell anaemia is considered as genetic diseases?

**(8 × 2 = 16 Marks)**

### SECTION – C

Answer **any six** questions. (Answer not exceeds **120** words) Each question carries **4** marks.

23. Comment on prenatal diagnostic techniques.
24. What are the different types of cleavage?

25. Write note on the social behaviour of elephant.
26. Comment on embryonic stem cell research.
27. Write note on different human chromosome categories.
28. What are different types of pheromones?
29. Differentiate oncogenes and tumour suppressor genes.
30. Explain the characteristics of motivation behaviour.
31. Comment on sex linked inheritance.

**(6 × 4 = 24 Marks)**

#### SECTION – D

Answer **any two** of the following. Each question carries **15** marks.

32. Explain polygenic inheritance and Multiple alleles.
33. Write an essay on type and physiology of learning.
34. Explain morphogenetic movements.
35. Elucidate autosomal and sex chromosomal syndromes in man.

**(2 × 15 = 30 Marks)**

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Reg. No. : .....

Name : .....

**Third Semester B.Sc. Degree Examination, March 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) : Biotechnology (Multimajor)**

**Complementary Course III**

**BV 1331.2 : ANGIOSPERM MORPHOLOGY AND SYSTEMATIC BOTANY**

**(2013-2018 Admission)**

Time : 3 Hours

Max. Marks : 80

- I. Answer **all** questions in a word or one or two sentence. Each question carries **1** mark.
1. Assign *Nicotianato* its family.
  2. How can you represent an gynoecium with 5 united and superior carpals in the floral formula?
  3. Name the fruit in *Eupatorium*.
  4. From which plant Cotton is obtained?
  5. Name the family with aggregate fruit.
  6. Write the relative position of floral parts.
  7. Name the family with hespirridium.
  8. Write the botanical name of Banana.

9. What is the morphology of pappus?
10. Which part of Sida is useful as medicine?

**(10 × 1 = 10 Marks)**

II. Answer **any eight** questions. Each questions carries **2** marks. Answer not to exceed **one** paragraph.

11. Write the binomial, family and useful parts of any two oil crops seen in Kerala.
12. Describe the structure of stamens in Asteraceae.
13. Write the floral formula of Verbenaceae.
14. Describe the gynoecium of Annonaceae.
15. With neat diagram describe Verticillaster? Name examples.
16. Write the binomial and family of any three medicinal plants you have studied.
17. Differentiate albuminous and exalbuminous seeds with examples.
18. Describe the androecium of Rubiaceae.
19. Write a short note on ICBN.
20. Draw the Floral Diagram of Apocynaceae.
21. What are the uses of Cotton?
22. Describe the modifications of sepals in Mussaenda.

**(8 × 2 = 16 Marks)**

III. Answer **any six** questions. Each questions carries **4** marks. Answer not to exceed **120** words.

23. Describe the floral characters of Malvaceae.
24. Describe with pictures and add examples any three kinds of placentation?



25. Draw the LS and floral diagram of Rutaceae.
26. Write the basics of Chemotaxonomy.
27. Describe the different kinds of Androecium in Leguminosae.
28. Draw the LS and floral diagram of the family Verbenaceae. Write floral formula.
29. What are the uses of herbarium?
30. Write the binomial family and morphology of the following plants.
  - (a) Clove
  - (b) Rice
  - (c) Colocasia
  - (d) Cumin.
31. Write a note on botanical gardens and its uses with examples.

**(6 × 4 = 24 Marks)**

IV. Answer **any two** questions. (not more than **3** pages) Each questions carries **15** marks.

32. Describe the salient features of Annonaceae with labeled diagrams. Write its systematic position.
33. What is herbarium? Describe the process of herbarium preparation.
34. Describe different types of Racemose inflorescence with suitable examples and diagrams.
35. What is meant by natural system of classification? Describe any one natural system of classification that you have studied.

**(2 × 15 = 30 Marks)**

Reg. No. : .....

Name : .....

**Third Semester B.Sc. Degree Examination, March 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) – Biotechnology (Multimajor)**

**Core Course – IV**

**BV 1341.1 : PHYCOLOGY, MYCOLOGY, LICHENOLOGY &  
PHYTOPATHOLOGY**

**(2019 & 2020 Admission)**

Time : 3 Hours

Max. Marks : 80

Draw diagrams wherever specified.

- I. Answer **all** the questions in a word or **1 to 2** sentences. Each question carries **1** mark. Draw diagrams wherever necessary.
1. What is Pyrenoid?
  2. Name any one alga that has no sexual reproduction.
  3. What are the special type of pigment present in *Sargassum*?
  4. Name any one nitrogen fixing algae.
  5. What is eye spot?
  6. Name the source plant of carrageenin.
  7. Name the binomial of any one edible fungi.
  8. Describe dikaryon with example.
  9. Comment on the role of Mycobiont.
  10. Define conidia.

**(10 × 1 = 10 Marks)**

P.T.O.

II. Answer **any eight** of the following. Each question carries **2** marks. (Answer not to exceed **1** paragraph)

11. Describe the chloroplast of *Oedogonium*.
12. Write a note on pit connections in red algae.
13. What is synzoospore?
14. What is heterotrichous habit? Add an example.
15. What are the functions of heterocyst?
16. Describe cap cell of *Oedogonium*.
17. Describe the structure of ascus.
18. Write a short note on aflatoxins.
19. Write a note on fungal nutrition.
20. Comment on host-parasite interactions.
21. Brief a note on habit of lichens.
22. Comment on control measures of root wilt disease of coconut.
23. Describe lateral conjugation.
24. Draw the picture of any two types of chloroplast in algae.
25. Brief a note on any two fungi from which medicines produced.
26. Write any two types storage food present in algae.

**(8 × 2 = 16 Marks)**

III. Answer **any six** of the following. Each question carries **4** marks. (Answer not to exceed **120** words)

27. Write a note on types of flagella in algae.
28. Comment on pigment constitution of algae.
29. Describe the sexual reproduction in *Vaucheria*.

30. Write a short account on the variations of chloroplasts in Chlorophyceae.
31. Describe the fruiting body of *Peziza* with diagrams.
32. Comment on the economic importance of *Saccharomyces*.
33. Write the composition, preparation and uses of Bordeaux mixture.
34. Give an account on the causative organism, symptoms, dissemination mechanism and control measures of Citrus canker.
35. Describe the carposporophyte of *Polysiphonia*. Draw diagrams.
36. Draw the life cycle of *Puccinia*.
37. Write a note on the storage food products in fungi.
38. Describe the cell wall structure of algae.

**(6 × 4 = 24 Marks)**

IV. Answer **any two** of the following. Each question carries **15** marks. (Answer not to exceed **3** pages)

39. Write detailed account on various thallus organizations of algae. Add examples and diagrams.
40. Describe various sexual reproductions in algae. Add examples and diagrams.
41. Write an essay on the economic importance of fungi.
42. Make an outline of the classification of fungi by Ainsworth.
43. Write a detailed note on the characters used in the classification of algae.
44. Give an account on various mechanisms to control fungal diseases.

**(2 × 15 = 30 Marks)**

(Pages : 4)

**N – 2873**

Reg. No. : .....

Name : .....

**Third Semester B.Sc. Degree Examination, March 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) : Biotechnology (Multimajor)**

**Core Course**

**BV 1341.2 – DEVELOPMENTAL BIOLOGY AND REPRODUCTIVE BIOLOGY**

**(For Zoology, Chemistry and Biotechnology)**

**(2019 & 2020 Admission)**

Time : 3 Hours

Max. Marks : 80

PART – A

Answer **all** questions in **one** or **two** sentences. **Each** question carries **1** mark.

1. Define Embryology.
2. Expand HCG.
3. Write on telolecithal egg.
4. Who proposed germplasm theory?
5. What is fate map?
6. Mention the type of egg in Amphioxus?
7. Mention the function of acrosome.

P.T.O.

8. Define MTP.
9. What is reproductive cloning?
10. Give a note on senescence.

**(10 × 1 = 10 Marks)**

### PART – B

Answer **any eight** questions. Answer not exceed **one** paragraph. Each one carries **2** marks.

11. Write down the classification of egg based of the amount of yolk.
12. Differentiate oestrous cycle from menstrual cycle.
13. Mention the significance of fertilization.
14. What is gastrulation?
15. State discoidal cleavage.
16. Explain invagination in frog development.
17. Write on the properties of stem cells.
18. Define cortical reaction.
19. Write a note on emboly.
20. Mention the properties of organizers in frog embryo.
21. Write on artificial insemination.
22. Mention pluripotency.
23. Define morula.

24. Give any four examples for teratogenic agents.
25. What is zona pellucida? Write its function.
26. Write on amniocentesis.

**(8 × 2 = 16 Marks)**

### PART – C

Answer **any six** questions. Answer not exceed **120** words. Each one carries **4** marks.

27. Sketch and label the structure of sperm.
28. Differentiate between miscarriage and stillbirth.
29. Discuss the patterns of cleavage based on amount and distribution of yolk.
30. Write on morphogenetic movements.
31. Ontogeny recapitulates Phylogeny. Who proposed this theory? Explain.
32. Explain the scope of Embryology.
33. Write on fetoscopy and its significance.
34. What are the different methods of contraception and birth control?
35. Explain different artificial marking methods to construct fate map.
36. Describe artificial insemination.
37. Sketch and label the fate map of chick embryo.
38. Explain why embryonic induction is important?

**(6 × 4 = 24 Marks)**

## PART – D

Answer **any two** questions in one or two sentences. Each one carries **15** marks.

39. Write an essay on extra embryonic membranes in chick.
40. Explain the structure and functions of placenta.
41. Write an account of eye development in frog. Substantiate it with labelled diagrams.
42. Distinguish the steps involved in the gastrulation of frog and chick.
43. Write an essay on nuclear transplantation experiments in Amphibians.
44. Explain oogenesis with diagrams.

**(2 × 15 = 30 Marks)**

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Reg. No. : .....

Name : .....

**Third Semester B.Sc. Degree Examination, March 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) : Biotechnology (Multimajor)**

**Core Course V**

**BV 1342.1 : BRYOLOGY, PTERIDOLOGY, GYMNOSPERMS AND  
PALEOBOTANY**

**(2019 and 2020 Admission)**

Time : 3 Hours

Max. Marks : 80

- I. Write a short note on the following. All question are compulsory. Each carries 1 mark.
1. In which plant rhizophore is present?
  2. What is the name given to the sporophyte in *Riccia*?
  3. What is gemma?
  4. Name the stele in *Psilotum*?
  5. What is the generic name of horse tail?
  6. In which time period the fossil plant Rhynia was lived.
  7. Name the pteridophyte having carinal canal.

8. What is sulphur shower?
9. Name the plant with synangium.
10. Name the gymnosperm with bordered pits.

**(10 × 1 = 10 Marks)**

II. Answer **any eight** of the following. Each carries **2** marks.

11. Give an account on absorptive organs in liverworts.
12. List out major vegetative reproduction mechanism in bryophytes.
13. Comment on the alternation of generation in bryophytes.
14. Write on adaptations of bryophytes to land habit.
15. What are foot and seta in bryophyte? What are their functions?
16. Describe the synangium of *Psilotum*.
17. Enumerate any four xerophytic adaptations of *Equisetum*.
18. Write on chimney pore of *Marchantia*.
19. Explain the gametophyte in *Psilotum*.
20. Describe the archegonium of *Funaria*.
21. Brief a note on megasporophyll of *Cycas*.
22. Comment on the microspore in *Pinus*.
23. Describe the ovule of *Cycas* with a diagram.
24. Comment on the xerophytic features of leaves in *Pinus*.
25. List out any four angiosperm features of *Gnetum*.
26. Write a note on bars of Sanio.

**(8 × 2 = 16 Marks)**

III. Answer **any six** of the following. Each carries **4** marks.

27. Explain the antheridiophore in *Marchantia*.
28. Give an account on gametophytes in *Lycopodium*.
29. Describe the anatomy of the leaf in *Cycas*.
30. Explain the male strobilus of *Pinus*.
31. Illustrate the stelar diversity in *Lycopodium*.
32. Explain the sporocarp in *Marsilea*.
33. Describe the ovule in *Gnetum*.
34. List out the characters of the secondary wood in *Pinus*.
35. Give an account on medicinal value of Gymnosperms.
36. Explain the stem anatomy of *Marsilea*.
37. Comment on the secondary growth in *Cycas*.
38. Describe the structure of leptosporangium.

**(6 × 4 = 24 Marks)**

IV. Answer **any two** of the following. Each carries **15** marks.

39. Give an account on thallus organization in the gametophyte of bryophytes.
40. Write and illustrate a detailed account on the stelar evolution in Pteridophyte.
41. Describe geological time scale with a chart.

42. What is heterospory? Comment on the importance of heterospory in the evolution of seed habit.
43. Describe the secondary growth in *Gnetum*. Draw diagrams.
44. Give an account on the habitats of Bryophytes with examples.

**(2 × 15 = 30 Marks)**

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Reg. No. : .....

Name : .....

**Third Semester B.Sc. Degree Examination, March 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) — Biotechnology (Multimajor)**

**Core Course**

**BV 1342.2 — ANIMAL DIVERSITY – II : CHORDATA**

**(For Zoology, Chemistry and Biotechnology)**

**(2019 & 2020 Admission)**

Time : 3 Hours

Max. Marks : 80

- I. Answer **all** the questions in **one** or **two** sentences. (Each question carries 1 mark)
1. Define Ichthyology.
  2. Rasping organ of Petromyzon is \_\_\_\_\_
  3. Acipenser commonly called as \_\_\_\_\_
  4. What is Hatchek's pit?
  5. \_\_\_\_\_ is known as flying lizard.
  6. Rhacophorus is commonly known as \_\_\_\_\_
  7. Name the feathers used for flight
  8. Name the Comb like process present in eye of birds.
  9. Write the Peculiarities of mammalian dentition.
  10. What are Baleen plates?

**(10 × 1 = 10 Marks)**

P.T.O.

II. Answer any **eight** of the following (Each question carries **2** marks). Answer should not exceed **one** paragraph each.

11. What is the Zoological importance of Latimeria?
12. What is Anadromous migration? Example.
13. What is a Swim bladder?
14. What is a Heterocercal tail?
15. Define Myotomes.
16. What are Neuromast organs?
17. Define Neoteny with an example.
18. Mention different respiratory organs in adult Amphibian.
19. Give the composition of bones present in Synsacrum.
20. What is a Pygostyle?
21. Name the snake producing neurotoxic venom and comment on its action.
22. Mention the similarities between snakes and lizards.
23. What are Eutherians?
24. Name Zoological name of 2 Primates.
25. What is Carnassials tooth? What is its function?
26. Differentiate Indian and African elephant.

**(8 × 2 = 16 Marks)**

III. Answer any **six** of the following (Each question carries **4** marks). Answer should not exceed **120** words.

27. Write down the salient features of Urochordata.
28. Explain the evolutionary importance of Latimeria.
29. Sketch and label Amphioxus.
30. Archaeopteryx is considered as a connecting link between Reptiles and Aves – substantiate this statement.

31. Distinguish between Perissodactyla and Artiodactyla with examples.
32. Write down the adaptations of Narcine.
33. Comment on Carnivora.
34. Give an account on lung fishes with example.
35. What is the zoological importance of Sphenodon?
36. Write notes on external morphology of Scoliodon.
37. Sketch and label the Human brain.
38. Name the Classes under Tetrapods with examples.

**(6 × 4 = 24 Marks)**

IV. Answer any **two** of the following (Each question carries **15** marks).

39. Comment on Retrogressive metamorphosis with an example.
40. Write an essay on accessory respiratory organs in fishes.
41. Essay on flight adaptation in birds.
42. Describe the Salient features of class Reptilia and classify upto sub classes giving suitable examples.
43. Salient and diagnostic features of Vertebrates.
44. Outline classification of Class Mammalia.

**(2 × 15 = 30 Marks)**

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N – 2876

Reg. No. : .....

Name : .....

**Third Semester B.Sc. Degree Examination, March 2022.**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) – Biotechnology (Multimajor)**

**Core Course**

**BV 1343 – PHYSICAL CHEMISTRY – I**

**(2019 & 2020 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. Each question carries 1 mark

1. The temperature at which the real or non-ideal gas behaves an ideal gas over a wide range of pressure is known as \_\_\_\_\_
2. A group of three numbers that indicates the orientation of a plane of atoms in a crystal is called \_\_\_\_\_
3. The total moles of a solute contained in 1000g of a solvent is called \_\_\_\_\_
4. What are isotonic solutions?
5. What is Joule-Thomson effect?
6. What is Arrhenius equation?
7. The linear relationship between the concentration and the absorbance of the solution is explained by \_\_\_\_\_

P.T.O.



8. What is quantum yield?
9. What are point groups?
10. What is the significance of hydrolysis constant?

**(10 × 1 = 10 Marks)**

SECTION – B

Answer **any eight** questions. Each question carries **2** marks

11. What is Virial equation of state?
12. Calculate the average speed for oxygen molecules at 298 K.
13. What are the laws of crystallography?
14. What are the factors affecting the surface tension of a liquid?
15. What is osmotic pressure?
16. Distinguish between molality and mole fraction
17. What is inversion temperature? What is its significance?
18. What is Carnot theorem?
19. What is the significance of Gibbs free energy?
20. What is Stark- Einstein law?
21. What are the reasons for very low quantum yield?
22. What is the importance of group multiplication table?
23. What are the applications of liquid crystals?
24. What is deliquescence?
25. What is the importance of hydrolysis constant?
26. What is the significance of leveling effect?

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer **any six** questions. Each question carries **4** marks

27. Discuss the behaviour of real gases. Discuss its deviations from ideal gases.
28. A certain solid X (at. Mass 27) crystallize in fcc. If the density of X is  $27 \text{ g/cm}^3$ . what is the unit cell length?
29. Describe the Beckmann's method of determination of molecular mass of a solute.
30. What are colligative properties? What are its applications?
31. What is the need of the second law of thermodynamics? Explain the various statements of the second law of thermodynamics.
32. The entropy and enthalpy change for the reaction between carbon monoxide and water to form carbon dioxide and hydrogen at 300K and 1 atm pressure are respectively  $-42.4 \text{ J/K}$  and  $-41.2 \text{ kJ}$ . Calculate the free energy change for the reaction.
33. Discuss the Lindermann mechanism
34. What is fluorescence? How is it differing from phosphorescence?
35. Distinguish between proper and improper axis of symmetry.
36. Discuss the various applications of liquid crystals
37. Explain the applications of solubility product.
38. 20 ml of 0.2 M sodium hydroxide was added to 50 ml of 0.2 m acetic acid solution to give 70 ml of the solution. What is the pH of the resulting solution? Calculate the additional volume of 0.2 M sodium hydroxide solution required to make the pH of the solution equal to 4.74.  $K_a(\text{HAc}) = 1.8 \times 10^{-5}$ .

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer **any two** questions. Each question carries **15** marks

39. (a) What is van der Waals equation of state? Derive the expression. What are its importances?  
(b) Explain the various elements of symmetry of a crystal.
40. What is viscosity? Discuss Poiseuille's law. Explain the determination of viscosity by Ostwald's method.

41. (a) Explain the concepts of entropy
- (b) For the conversion of a mole of  $\text{SO}_2(\text{g})$  into  $\text{SO}_3(\text{g})$  the enthalpy of reaction at constant volume,  $\Delta E$ , at 298 K is -97.027 kJ. Calculate the enthalpy of the reaction at constant pressure.
42. Explain the various types of complex reactions.
43. Explain the various elements of symmetry.
44. (a) What is Clausius — Clapeyron equation? What is its application?
- (b) Calculate the volume of 0.1 N HCl that should be added to 500 ml of 0.1 M sodium acetate solution to prepare a buffer of pH 5.  $\text{pK}_a$  for acetic Acid is 4.74.

**(2 × 15 = 30 Marks)**

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**N – 2877**

**Reg. No. :** .....

**Name :** .....

**Third Semester B.Sc. Degree Examination, March 2022**

**Career Related First Degree Programme Under CBCSS**

**Group 2 (b) – Biotechnology (Multimajor)**

**Core Course IV**

**BV 1344 – FOOD AND INDUSTRIAL BIOTECHNOLOGY**

**(2019 & 2020 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** the questions in **a word** or **one** or **two** sentences. **Each** question carries **1** mark.

1. Name two agricultural waste used in fermentation.
2. What is starter culture?
3. Name the antibiotic known as 'Wonder drug'.
4. Define a chemostatic culture.
5. What are baffles?
6. Name the organism causing Cholera.
7. What is scale up process?
8. Define pasteurization.

**P.T.O.**

9. What is filtration?
10. Name a microorganism commonly used in baking industry.

**(10 × 1 = 10 Marks)**

**SECTION – B**

Answer any **eight** questions. Each question carries **2** marks. (Answer not to exceed **one** paragraph)

11. What is dry heat sterilization?
12. List any four products of fermentation.
13. What are the advantages of probiotics?
14. How immobilization of enzymes are helpful in storage?
15. What is yoghurt? How is it prepared?
16. List any two food borne diseases and its causative organism.
17. What is downstream processing in fermentation?
18. High moisture content can enhance food spoilage. Why?
19. What are the factors affecting fermentation?
20. Differentiate between alcoholic and lactic acid fermentation.
21. What is continuous fermentation?
22. How ethanol is produced?
23. Mention the steps in brewing process.

24. What is shelf life period?
25. Name the microorganisms used for the production of glutamic acid.
26. What is product recovery?

**(8 × 2 = 16 Marks)**

SECTION – C

Answer any **six** questions. Each question carries **4** marks. (Answer not to exceed **120** words)

27. What is sauerkraut? Explain its preparation.
28. Give a short account on milk borne disease.
29. Discuss various chromatographic techniques used in downstream processing.
30. Explain the industrial process of cheese production.
31. Describe briefly different types of bioreactors.
32. Explain the microbial production of amylase.
33. Differentiate between primary and secondary screening of microorganisms.
34. Explain the industrial production of wine.
35. Discuss the role of microbes in meat spoilage.
36. Explain the features of batch fermentation.
37. What are natural food preservatives? Give examples?
38. Brief a note on solid state fermentation.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. Each question carries **15** marks. (Answer not to exceed **three** pages)

39. What are bioreactors? Explain the parts of a bioreactor with suitable diagram.
40. Discuss the role of microbes in dairy industry.
41. Explain the microbial production of Penicillin.
42. What is fermentation media? What are the characteristics of an ideal production media?
43. Explain various methods of food preservation.
44. Describe the production of single cell proteins.

**(2 × 15 = 30 Marks)**

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**N – 2878**

Reg. No. : .....

Name : .....

**Third Semester B.Sc. Degree Examination, March 2022**

**Career Related First Degree Programme Under CBCSS**

**Group 2(b) – Biotechnology (Multimajor)**

**Core Course V**

**BV 1345 – MOLECULAR BIOLOGY**

**(2019 & 2020 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions in a word or **one** or **two** sentences. **Each** question carries **1** mark.

1. What is nucleolar organizer?
2. Mention the significance of DNA polymerase.
3. What is the major contribution of Barbara McClintock?
4. Define a telomere.
5. What are rho proteins?
6. Define a start codon.
7. What is central dogma in biology?
8. What is the function of reverse transcriptase enzyme?

**P.T.O.**



9. Define histones.
10. What are enhancers in eukaryotic transcription?

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer **any eight** questions. **Each** question carries **2** marks. (Answer not to exceed one paragraph)

11. What are micro RNAs? What is its role in gene regulation?
12. List the functions of ribozymes.
13. What are polysomes?
14. State the significance of RNAi.
15. What are promoters in eukaryotic transcription?
16. Write a note on DNA helicase and its function.
17. What is semiconservative model for DNA replication?
18. Differentiate a reading frame and an open reading frame.
19. Comment on termination codon.
20. What is gene silencing?
21. Write a note on the secondary structure of proteins.
22. What is a cistron?
23. What is the function of Shine Dalgarno sequence?
24. What are insertion elements?
25. Define spliceosome. What is its importance?
26. What is TATA box?

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer **any six** questions. **Each** question carries **4** marks. (Answer not to exceed **120** words)

27. How do regulatory genes work?
28. What is codon assignment?
29. Explain Hershey and Chase experiment and its importance on identifying DNA as the genetic material.
30. Describe the features of genetic code.
31. What is the role of glucose in catabolite repression?
32. Explain the function of different types of RNA.
33. Differentiate nucleosome from chromatin.
34. Write a brief note on transposons.
35. Explain the translation of polycistronic mRNA.
36. Compare and contrast between A-DNA, B-DNA and Z-DNA.
37. What is gene splicing?
38. Differentiate euchromatin and heterochromatin.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer **any two** questions. **Each** question carries **15** marks. (Answer not to exceed **three** pages)

39. Explain the structure of a prokaryotic gene.
40. What is translation? Write an account on post translational modification of proteins.
41. Describe the process of translation in prokaryotes with suitable diagrams.

42. Explain the molecular organization of eukaryotic chromosomes.
43. Write an essay on cytoplasmic genome.
44. Describe in detail DNA replication in eukaryotes.

**(2 × 15 = 30 Marks)**

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**N – 2879**

Reg. No. : .....

Name : .....

**Third Semester B.Sc. Degree Examination, March 2022**

**Career Related First Degree Programme Under CBCSS**

**Group 2(b) – Biotechnology (Multimajor)**

**Complementary Course III**

**BV 1331.1 — DEVELOPMENTAL BIOLOGY, HUMAN GENETICS AND  
ANIMAL BEHAVIOUR**

**(For Botany, Chemistry and Biotechnology)**

**(2019 and 2020 Admission)**

Time : 3 Hours

Max. Marks : 80

- I. Answer **all** the questions in a word or **one** or **two** sentences. Each question carries **1** mark.
1. Blastulation.
  2. Epiboly.
  3. Imprinting.
  4. Lyon's hypothesis.
  5. Autosomal syndrome.
  6. Royal jelly.
  7. Innate releasing mechanism.
  8. Involution

P.T.O.

9. Organizers.
10. Delamination

**(10 × 1 = 10 Marks)**

II. Answer any **eight** of the following. Each question carries **2** marks. Answer not to exceed **one** paragraph

11. Edward's syndrome.
12. Embryonic induction.
13. Human gene therapy.
14. Fixed action pattern.
15. XXX Syndrome.
16. Oncogenes.
17. Eugenics.
18. Autosomes.
19. Inter sex.
20. Instinctive behaviour.
21. Ultrasound scanning.
22. Reflexes.
23. Latent learning.
24. Animal cloning.
25. Insight learning
26. Genetic counselling.

**(8 × 2 = 16 Marks)**

III. Answer any **six** of the following. Each question carries **4** marks. Answer not to exceed 120 words

27. Explain the functions of Worker and Drone in a honeybee colony.
28. Briefly explain the genetics of ABO blood groups.
29. Explain any two prenatal diagnostic technique.
30. Write notes on Oncogenes and tumour suppressor genes.
31. Explain the different types morphogenetic movements.
32. Describe sex chromosomal syndromes.
33. Explain polygenic inheritance with example.
34. Explain sex-influenced inheritance.
35. Describe genetic disorders with suitable examples.
36. Explain sex limited inheritance.
37. Describe Mendelian traits.
38. Explain the technique of sex determination.

**(6 × 4 = 24 Marks)**

IV. Answer any **two** of the following. Each question carries 15 marks. Answer a long Essay type.

39. Write an essay on the different types and patterns of cleavages.
40. Explain the following
  - (a) Sickle cell anaemia.
  - (b) Down's syndrome.
  - (c) Phenylketoneuria
  - (d) Klinefelter syndrome

41. Write an essay on the stimulus and response theory with suitable examples.
42. Explain the mechanism of blood clotting.
43. Write an essay on sociobiology its merits and demerits and the properties of societies.
44. Describe the type of societies of Elephants.

**(2 × 15 = 30 Marks)**

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**N – 2880**

**Reg. No. :** .....

**Name :** .....

**Third Semester B.Sc. Degree Examination, March 2022**

**Career Related First Degree Programme Under CBCSS**

**Group 2(b) – Biotechnology (Multimajor)**

**Complementary Course III**

**BV 1331.2 – ANGIOSPERM MORPHOLOGY, SYSTEMATIC BOTANY AND  
ECONOMIC BOTANY**

**(2019 & 2020 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions in a word or **one** or **two** sentences. **Each** question carries **1** mark.

1. Write the Binomial and Family of Cumin.
2. Which family possess reniform anthers?
3. What is thyrsus?
4. What is diadelphous condition?
5. What is binomial nomenclature?
6. Which Family has a enlarged and swollen persistent calyx?
7. What is the peculiarity of stamens in Rutaceae?
8. What is OTU?

**P.T.O.**



9. Name a phylogenetic classification.
10. What is chemotaxonomy?

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer **any eight** questions. **Each** question carries **2** marks. (Answer not to Exceed **one** Paragraph)

11. List the binomial, family and morphology of the useful part of any 2 legumes.
12. What are botanical gardens?
13. What are tautonyms?
14. What is a paratype?
15. What are the diagnostic characters of the family Verbenaceae?
16. Describe hypanthodium with illustration.
17. Explain apocarpous condition with example.
18. What are Multi State and Unit Characters?
19. Describe the family Rutaceae with a note on its economical importance.
20. What is a capitulum?
21. What is the use of poisoning in Herbarium preparation?
22. Comment on Molecular Taxonomy?
23. Differentiate between albuminous and exalbuminous seeds with example.
24. Explain the floral diagram with an example from Malvaceae.
25. Explain the binomial, family, morphology of the useful part and uses of any two Cereals and Millets.
26. Describe any two medicinal plants with its binomial, family and utility.

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer **any six** questions. **Each** question carries **4** marks. (Answer not to exceed **120** Words)

27. Describe the floral morphology of Rubiaceae with floral diagrams
28. Outline any one artificial system of classification.
29. Write a short note on different types of Placentation.
30. Write Binomial, Family, Morphology of the useful part and Utility of any two tropical fruits and tuber crops.
31. Illustrate Papilionaceous corolla? Describe its peculiarities.
32. What is Ruminant endosperm and name the family in which it is present?
33. What are the primitive characters of Annonaceae?
34. Briefly explain cytotaxonomy with examples.
35. What is the significance of Botanical gardens in Conservation?
36. Shortly comment on the scope and significance of Taxonomy.
37. Comment on the importance of herbarium. Name any one herbarium.
38. Explain flower as a modified shoot?

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer **any two** questions. **Each** question carries **15** marks. (Answer not to exceed **three** pages)

39. Explain different types of inflorescence.
40. Describe in detail the families Asteraceae and Poaceae. Why these two families are considered as advanced?

41. Briefly explain the major rules of ICBN.
42. Write an essay on Modern Trends in taxonomy.
43. Describe the Family Solanaceae with the economic importance. Illustrate its floral diagram with floral formula.
44. Compare and contrast the subfamilies of Leguminosae.

**(2 × 15 = 30 Marks)**

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**N – 8075**

**Reg. No. :** .....

**Name :** .....

**Fourth Semester B.Sc. Degree Examination, August 2022**

**Career Related First Degree Programme Under CBCSS**

**Group 2(b) – Biotechnology (Multimajor)**

**Core Course VI**

**BV 1441.1 : PLANT PHYSIOLOGY**

**(2015-2018 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions in one word or sentence.

1. What is vernalisation?
2. Name an anti transpirant.
3. Why Transpiration is called a 'Necessary Evil'.
4. What is Osmosis?
5. Give example for a C4 plant.
6. Which hormone is naturally occurring in coconut water?
7. What is action spectrum?
8. *n* Name an organism capable of Nitrogen fixation independently.

**P.T.O.**

9. What is a day-neutral plant?
10. What is nyctinastic movement?

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer **any eight** questions, Short Answer (Not to Exceed One Paragraph).

11. How are enzymes regulated?
12. What is Phosphorescence?
13. What are accessory pigments? What is its role?
14. How important is water potential?
15. How is photosynthesis influenced by different factors?
16. What are plant growth regulators?
17. How Donnan equilibrium explains Passive transport?
18. List out the deficiency symptoms of Phosphorus in Plants
19. Comment on Sand culture and Aeroponics?
20. Explain Lundegardh hypothesis.
21. What is a red drop?
22. What is transpiration Pull? What is its role in upward conduction of Water and Minerals.

**(8 × 2 = 16 Marks)**

### SECTION – C

Short Essay. Answer **any six** questions.

23. With Suitable illustrations, explain C4 Cycle.
24. What are trace elements? How is it important in Plant growth?

25. Briefly explain the Non- Cyclic Photophosphorylation, What is its Energy output?
26. Explain Hill's Reaction.
27. Explain photorespiration. Comment on its significance.
28. What is R.Q and its significance?
29. What is the mechanism of enzyme action?
30. Explain the Energy relation of respiration.
31. Elaborate Mechanism of transport - Munch hypothesis.

**(6 × 4 = 24 Marks)**

#### SECTION – D

Essay. Answer **any two** questions.

32. With suitable diagrams illustrate the different steps involved in Calvin Cycle. Comment on its energy output.
33. Briefly discuss the Plant movements and its adaptive significance. Comment on Photoperiodism.
34. Classify enzymes based on Enzyme commission. State mechanism of Enzyme action and Enzyme inhibition.
35. What are the different Plant growth regulators that you have studied, explain its commercial significance.

**(2 × 15 = 30 Marks)**

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**N – 8080**

Reg. No. : .....

Name : .....

**Fourth Semester B.Sc. Degree Examination, August 2022**

**Career Related First Degree Programme Under CBCSS**

**Group 2(b) : Biotechnology (Multimajor)**

**Core Course**

**BV 1446 : RECOMBINANT DNA TECHNOLOGY**

**(2013 – 2018 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions in a word or **one** or **two** sentences. **Each** question carries **1** mark.

1. Define cloning.
2. What are endonucleases?
3. What is the function of DNA ligases?
4. What are selectable markers?
5. Comment on 'super bugs'.
6. What are phagemids?
7. Expand RAPD.
8. Define palindromic sequences?

**P.T.O.**

9. What is electrophoresis?
10. What is meant by in vivo gene therapy?

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer **any eight** questions. **Each** question carries **2** marks. Answer not to exceed one paragraph.

11. Write a short note on alkaline phosphatases.
12. What is germ line gene therapy? What is its peculiarity?
13. What are liposomes? What is its application in genetic engineering?
14. Discuss any two ethical issues associated with genetic engineering.
15. Write a short note on electroporation.
16. Give the unique features of M13 cloning vector.
17. Write a brief description of BAC.
18. What is microinjection?
19. What are expression vectors? How do they differ from other vectors in their organization?
20. Write a short note on GFP.
21. What are competent cells? How are they prepared?
22. Briefly describe the procedure of Southern hybridization.

**(8 × 2 = 16 Marks)**

### SECTION – C

Answer **any six** questions. **Each** question carries **4** marks. Answer not to exceed **120** words.

23. Explain the working of gene gun.
24. Describe the organization and peculiarities of cosmids.
25. Give an account of YAC.



26. Write a note on Human Genome Project highlighting the goals.
27. Write a note on any two viral vectors used in gene therapy.
28. Describe the Sanger's method of DNA sequencing.
29. Explain the role of *Agrobacterium tumefaciens* in the production of GM plants.
30. What are molecular scissors? What are the different types?
31. Describe the procedure of AFLP analysis.

**(6 × 4 = 24 Marks)**

#### SECTION – D

Answer **any two** questions. **Each** question carries **15** marks. Answer not to exceed three pages.

32. Give a description of pBR322 and  $\lambda$  phage vector. Give the properties of an ideal plasmid vector.
33. Write an essay on the applications of GM organisms in the field of agriculture and medicine.
34. Explain (a) RFLP (b) DNA Microarray (c) DNA library.
35. What is PCR? Explain its procedure and application.

**(2 × 15 = 30 Marks)**

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**N – 8081**

Reg. No. : .....

Name : .....

**Fourth Semester B.Sc. Degree Examination, August 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**Core Course VI**

**BV 1447 : IMMUNOLOGY**

**(2013 & 2018 Admissions)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions. Answer in **one word** to maximum of **two** sentences. **Each** question carries **1** mark.

1. What is the first line of defense against infections?
2. What is Castleman disease?
3. Name any three covid vaccines that are available in India.
4. What is cell-mediated immunity?
5. Name any three autoimmune diseases.
6. Comment on epitope.
7. What are idiotypes?
8. What is meant by avidity?

**P.T.O.**

9. Comment on toxoid vaccines.
10. Name the promising immunotherapy drug using in the treatment of rectal cancer.

**(10 × 1 = 10 Marks)**

SECTION – B

Short answer type (Not to exceed one paragraph) Answer any **eight** questions from the following. **Each** question carries **2** marks.

11. What are the major types of lymphocytes?
12. What is innate immunity?
13. Comment on cytokines.
14. Which are the different types of antigens?
15. Brief a note on haptens.
16. What is cross reactivity?
17. Mention the use of HAT medium.
18. What are mRNA vaccines?
19. What are chimeric antibodies?
20. Explain the nomenclature of monoclonal antibodies.
21. Write short note on Hashimoto's thyroiditis.
22. What is myasthenia gravis?

**(8 × 2 = 16 Marks)**

SECTION – C

Short essay (not to exceed 120 words) Answer any **six** questions from the following. **Each** question carries **4** marks.

23. Write short note on lymphoid organs.
24. Compare different types of immunity.
25. Write the principle of ELISA.

26. How are monoclonal antibodies produced?
27. Brief a note on different types of vaccines.
28. Explain the use of immunotherapy.
29. Comment on major histocompatibility complex.
30. What is B cell activation?
31. What is agglutination?

**(6 × 4 = 24 Marks)**

SECTION – D

Long essay.

Answer any **two** questions from the following.

**Each** question carries **15** marks.

32. What are antibodies? Explain its structure and functions.
33. Explain in detail, antigen-antibody interactions.
34. Describe T cell-mediated immunity.
35. Write an essay on phagocytosis and its importance.

**(2 × 15 = 30 Marks)**

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N – 8082

Reg. No. : .....

Name : .....

Fourth Semester B.Sc. Degree Examination, August 2022

Career Related First Degree Programme under CBCSS

Core Course V

Group 2(b) Biotechnology (Multimajor)

BV 1444 : PHYSICAL CHEMISTRY II

(2013 – 2018 Admissions)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. **Each** question carries **1** mark.

1. What are *operators*?
2. Write down the time-dependent Schrodinger equation.
3. What are redox indicators?
4. Explain the term *EMF* of a cell.
5. Write one example for reference electrode.
6. Give the *Freundlich* adsorption equation?
7. For oxygen molecule, pure rotational spectra is absent whereas rotational Raman spectra is present. Explain?

P.T.O.

8. What kind of species are investigated by ESR spectroscopy?
9. Calculate the frequency for a radiation of wavelength 200nm?
10. What is the use of *Scanning Tunneling Microscopy* (STM)?

**(10 × 1 = 10 Marks)**

SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks.

11. What is *Planck's* quantum hypothesis?
12. If  $l = 2$  for an electron, what are the permitted values of 'm'?
13. What is meant by *reference electrode*? Give an example.
14. Write the Nernst equation for the Daniel cell and explain the terms involved.
15. Calculate the constant volume heat capacity of an ideal monoatomic gas.
16. What is meant by *Brownian* motion?
17. Calculate the half cell potential at 298K for the reaction:  $\text{Zn}^{2+}(\text{aq}) + 2\text{e}^- \rightleftharpoons \text{Zn}(\text{s})$ .  
Given  $[\text{Zn}^{2+}]$  is 0.1 M.
18. What is meant by non-elastic gel? Give an example.
19. State *Hardy-Schulze* law.
20. How can a sol of ferric hydroxide be prepared in the laboratory?
21. What is the effect of temperature on enzyme catalysis?
22. What is meant by *critical solution temperature*?

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions. **Each** question carries **4** marks.

23. Explain the term *black body spectra*.
24. Sketch the conductometric titration curves for
  - (a) a strong acid-weak base titration and
  - (b) a weak acid-weak base titration and explain.
25. What are *fuel cells*? Discuss H<sub>2</sub>-O<sub>2</sub> fuel cell.
26. Derive the expression for internal energy in terms of partition functions.
27. Calculate the ground state energy of an electron confined in a 1D box of length 4Å. (Mass of electron =  $9.1 \times 10^{-31}$  Kg). Also calculate its energy when it is in the n = 2 level.
28. Convert the Schrodinger wave equation from Cartesian coordinates to spherical polar coordinates.
29. Write a note on *azeotropic mixtures*.
30. Write a note on *Nernst heat theorem*.
31. Discuss the *hyperfine splitting* shown by the methyl radical in its ESR spectrum.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. **Each** question carries **15** marks.

32. State and explain the postulates of *quantum mechanics*.
33. Derive the expression for
  - (a) the moment of inertia and
  - (b) expression for rotational energy of a rigid diatomic molecule.

34. (a) State and explain *Kohlraush's* law. How is it useful in the determination of limiting molar conductivity of acetic acid?
- (b) The limiting molar conductivities for  $\text{NH}_4\text{Cl}$ ,  $\text{NaOH}$  and  $\text{NaCl}$  are 129.8, 217.4 and 108.9  $\text{ohm}^{-1} \text{cm}^2 \text{mol}^{-1}$  respectively at 291 K. The electrolytic conductivity of a 0.01 M solution of  $\text{NH}_4\text{OH}$  at 291 K is  $9.33 \times 10^{-5} \text{ohm}^{-1} \text{cm}^{-1}$ . Calculate the degree of dissociation of  $\text{NH}_4\text{OH}$  at this dilution.
35. (a) Derive the *Michaelis-Menten* equation for enzyme catalysis.
- (b) Write a note on vapour pressures of *real* and *non-ideal* solutions.
- (2 × 15 = 30 Marks)**
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(Pages : 4)

**N – 8083**

**Reg. No. :** .....

**Name :** .....

**Fourth Semester B.Sc. Degree Examination, August 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**Core Course**

**BV 1441.1 : PLANT PHYSIOLOGY**

**(2019 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** the questions in **a word** or **one or two** sentences. Each question carries **1** mark.

1. What is an apoenzyme?
2. Name two micro elements.
3. What is biological clock?
4. What are antitranspirants?
5. Expand RUBISCO.
6. What is symplast?
7. Define photosynthetic unit.
8. What are oxysomes?

**P.T.O.**

9. Define water potential.
10. What is ammonification?

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer any **eight** questions. Each question carries **2** marks. (Answer not exceed **one** paragraph)

11. What is glycolysis?
12. Explain induced fit theory of enzyme action.
13. Define alcoholic fermentation.
14. What are nif genes?
15. Explain Emerson enhancement effect.
16. What is phloem loading and unloading?
17. Classify plants based on their photoperiodic response.
18. What is seismonasty? Give an example.
19. State the difference between transpiration and guttation.
20. What is R.Q.? Explain its significance.
21. Brief a note on Crassulacean Acid Metabolism.
22. What is quantum requirement?
23. Explain transpiration pull theory of ascent of sap in plants.
24. What is reductive amination?

25. List the internal factors affecting photosynthesis.
26. What are the deficiency symptoms of nitrogen in plants?

**(8 × 2 = 16 Marks)**

### SECTION – C

Answer any **six** questions. Each question carries **4** marks. (Answer not to exceed **120 words**)

27. Brief a note on hydroponics.
28. Explain the mechanism of active salt absorption in plants.
29. What are enzymes? How they are classified.
30. Comment on plant response to water stress.
31. Explain photolysis of water in photorespiration.
32. Draw the schematic representation of photorespiration.
33. What is vernalization? What is its significance?
34. Explain the K<sup>+</sup> ion exchange theory of stomatal opening.
35. Briefly explain the process of tricarboxylic acid cycle.
36. Describe Munch mass flow hypothesis.
37. What are the factors affecting respiration?
38. Explain the structure and function of chloroplast.

**(6 × 4 = 24 Marks)**

SECTION – D

Answer any **two** questions. **Each** question carries **15** marks. (Answer not to exceed **three pages**)

39. Discuss the physiological role of various plant growth hormones.
40. Describe the mechanism of water absorption in plants.
41. What is Nitrogen Cycle? Explain in detail its various steps and importance.
42. Compare the carbon dioxide fixation in C<sub>3</sub> and C<sub>4</sub> plants. Mention their significance.
43. "Transpiration is a necessary evil". Justify.
44. Give an account on electron transport system and oxidative phosphorylation.

**(2 × 15 = 30 Marks)**

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(Pages : 3)

**N – 8084**

**Reg. No. :** .....

**Name :** .....

**Fourth Semester B.Sc. Degree Examination, August 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**Core Course – VI**

**BV 1441.2 : ANIMAL PHYSIOLOGY**

**(For Zoology, Chemistry and Biotechnology)**

**(2019 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

I. Answer **all** questions.

1. Micturition
2. Emphysema
3. Pellagra
4. BMR
5. Dialysis
6. Reflex arc
7. Anticoagulants
8. Prostaglandins
9. Organ of Corti
10. Saprozoic nutrition

**(10 × 1 = 10 Marks)**

P.T.O.

II. Answer **any eight** of the following.

11. Diabetes insipidus
12. Write short notes on body fluids
13. Bombay blood group
14. Sarcomere
15. Explain the functions and deficiency diseases of fat soluble vitamins
16. Neuromuscular junction
17. What is glomerular filtration?
18. Distinguish between ureotelism and uricotelism with examples
19. Erythroblastosis foetalis
20. Give short notes on taste receptors
21. Briefly explain different types of muscles
22. What is the importance of bile in digestion
23. EEG
24. Myocardial infraction
25. Illustrate the structure of microvilli
26. What is fatigue?

**(8 × 2 = 16 Marks)**

III. Answer **any six** of the following.

27. Add a short note on hormonal regulation of renal function.
28. Illustrate the structure of human heart.
29. Give an account of Alzheimer's disease and the possible disease management strategies.

30. Briefly explain the intrinsic and extrinsic mechanisms of blood clotting
31. Give an account of placental hormones in human beings.
32. Briefly explain the hormone action at different levels like, cell membrane, organelles and genes.
33. The “Master gland”.
34. Give an account of pace maker and conduction system of heart.
35. What are the theories of muscle contraction?
36. Briefly explain positive and negative feedback regulation in hormonal action.
37. Give an account of tubular secretion.
38. Give an account of absorption of fat in man.

**(6 × 4 = 24 Marks)**

IV. Answer **any two** of the following.

39. Give an account of initiation and conduction of nerve impulse
40. Illustrate the structure of human nephron. Add a note on countercurrent system
41. Explain any five hormonal disorders in man
42. Explain the role of blood in the transport of respiratory gases
43. Give an account of vitamin deficiency disorders in man
44. Explain the structure and functions of human ear

**(2 × 15 = 30 Marks)**

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(Pages : 4)

**N – 8085**

**Reg. No. :** .....

**Name :** .....

**Fourth Semester B.Sc. Degree Examination, August 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**Core Course**

**BV 1442.1 - CELL BIOLOGY, PLANT BREEDING & EVOLUTIONARY  
BIOLOGY**

**(2019 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** the questions in a word or **one** or **two** sentences. **Each** question carries **1** mark.

1. What are Polysomes?
2. Define kinetochore.
3. Why lysosomes are called 'suicidal bags of the cell'?
4. Name any two agencies of plant introduction in India.
5. What is Turner's syndrome?
6. Give an example for an intergeneric hybridization.
7. What is progressive evolution?

**P.T.O.**



8. Define quarantine.
9. What is plasmodesmata?
10. List any two functions of cell wall.

(10 × 1 = 10 Marks)

SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks. (Answer not to exceed **one paragraph**)

11. What are acrocentric chromosomes?
12. Discuss the role of polyploidy in evolution.
13. What is a composite variety?
14. Explain the 'S' phase of cell cycle.
15. What are golgi bodies?
16. Explain mutation theory by De Vries.
17. What is the significance of mitosis?
18. Differentiate between primary and secondary introduction.
19. What are peroxisomes? Comment on their functions.
20. Mention the functions of microtubules.
21. What are B chromosomes?
22. Comment on resistance breeding.
23. What is interspecific hybridisation? Give an example.
24. Differentiate between paracentric and pericentric inversion..

25. Mention the achievements of plant introduction.
26. What is satellite DNA?

**(8 × 2 = 16 Marks)**

SECTION – C

Answer any **six** questions. **Each** question carries **4** marks. (Answer not to exceed 120 words)

27. Comment on chromosomal translocations.
28. Describe the structure and functions of mitochondria.
29. Explain the procedure of hybridization in plants.
30. Write a note on parallel and convergent evolution.
31. Differentiate between euchromatin and heterochromatin.
32. Discuss the importance of heterosis in plant breeding.
33. Comment on Neo-Darwinism.
34. Describe the structure of salivary gland chromosomes of *Drosophila*.
35. What are the objectives of plant breeding.
36. List out the major differences between Prokaryotic and Eukaryotic cells.
37. Describe the fluid mosaic model of plasma membrane.
38. Briefly explain the structure of an interphase nucleus.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. **Each** question carries **15** marks.(Answer not to exceed **three pages**)

39. Explain the procedure of mutation breeding. Discuss its application in crop improvement.
40. Describe the major steps in meiosis with suitable illustrations.
41. What is selection? Explain various selection methods used in plant breeding.
42. Explain various numerical aberrations of chromosomes.
43. Give an account on various forces leading to evolution.
44. Explain the nucleosome model of chromatin organization. Add a note on nucleoproteins.

**(2 × 15 = 30 Marks)**

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(Pages : 3)

**N – 8086**

**Reg. No. :** .....

**Name :** .....

**Fourth Semester B.Sc. Degree Examination, August 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**Core Course – VII**

**BV 1442.2 : CELL BIOLOGY**

**(For Zoology, Chemistry and Biotechnology)**

**(2019 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

- I. Answer **all** questions.
1. Prokaryotes
2. Glyoxisomes
3. Telocentric Chromosome
4. Apoptosis
5. Synapsis
6. Unit membrane concept
7. Poly ribosomes
8. Chromosome puffs
9. Aneuploidy
10. Inversion.

**(10 × 1 = 10 Marks)**

P.T.O.

II. Answer **any eight** of the following.

11. Differentiate between prokaryotic and eukaryotic cells
12. Active transport
13. Write a note on PPLO
14. Functions of golgi bodies
15. Polytene chromosomes
16. Write note on different types of tumor.
17. What are microfilaments? Write their functions.
18. Write note on functions of Synaptonemal complex.
19. Write a note on plasmadesmata.
20. Write a note on metastasis.
21. What are centrioles?
22. What are carcinogens?
23. Differentiate between endocytosis and exocytosis.
24. Comment on cell theory.
25. Comment on balbiani rings.
26. Write a note on nuclear pore.

**(8 × 2 = 16 Marks)**

III. Answer **any six** of the following

27. Explain fluid mosaic model of plasma membrane.
28. Explain Cell cycle.
29. Write a note on chromosome structure.
30. Comment on Golgi bodies.

31. Write a note on cytoskeleton.
32. Explain nucleosome.
33. Explain crossing over.
34. Explain the structure and function of centriole.
35. Differentiate between Euchromatin and heterochromatin.
36. Explain zygotene and pachytene stages of prophase I.
37. Explain lamp brush chromosomes.
38. Write an account on cell signalling.

**(6 × 4 = 24 Marks)**

IV. Answer **any two** of the following

39. Explain the structure and function of mitochondria.
40. Illustrate the structure of metaphase nucleus.
41. Write an account on different types of chromosomal aberrations.
42. Explain different phases of meiosis.
43. Explain electron transport chain.
44. Explain the structure and functions of Endoplasmic reticulum.

**(2 × 15 = 30 Marks)**

(Pages : 4)

**N – 8087**

Reg. No. : .....

Name : .....

**Fourth Semester B.Sc. Degree Examination, August 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**Core Course VII**

**BV 1446 : RECOMBINANT DNA TECHNOLOGY**

**(2019 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions in a word or **one /two** sentences. Each question carries **1** mark.

1. What is a chimaera?
2. What do you understand from the term gene cloning?
3. Define a vector
4. Write any two genes conferring resistance against antibiotics in vectors
5. What is a 'cos' site?
6. What is electroporation?
7. What are transgenic organisms?
8. Expand RAPD.

**P.T.O.**

9. What is a Klenow fragment?
10. What is mean by shotgun genome sequencing?

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer any **eight** questions. Each question carries **2** marks. Answer not to exceed **one** paragraph.

11. How naming done in restriction endonucleases?
12. Differentiate cohesive ends from flush ends during restriction enzyme digestion.
13. What is the peculiarity of the recognition sequence of restriction endonucleases?
14. What are the properties of a good vector?
15. Differentiate cloning vector from expression vector.
16. What is a replacement phage vector?
17. Write any two vectors used in gene therapy. Comment on any two features of such vectors.
18. What are shuttle vectors? Why they are called so?
19. How a cDNA library is different from genomic DNA library?
20. How competent *E. coli* cells are prepared for gene cloning?
21. What are combination vectors? Write two examples?
22. What is mean by vector mediated gene transfer?
23. What is the principle of RFLP?



24. How Northern hybridization helps in gene expression studies?
25. What is the principle of Maxam-Gilbert sequencing?
26. What is AFLP analysis?

**(8 × 2 = 16 Marks)**

SECTION – C

Answer any **six** questions. Each question carries **4** marks. Short essay type.

27. Write a note on the classification of restriction endonucleases with one example in each class.
28. What are the different types of modifications possible for the cut ends generated by restriction endonucleases? Explain the role of enzymes in each case
29. Write a note on the selection of recombinants in lambda phage vector
30. What are the properties of phage M13 vectors?
31. Describe the structure and essential features of a cosmid vector.
32. How BAC vectors are constructed?
33. Write a short note on calcium phosphate precipitation method of gene transfer
34. How lipofection method is different from electroporation method?
35. How transformed cells are screened?
36. Write a note on Southern hybridization technique.
37. Comment on bio safety aspects of genetic engineering.
38. Explain the types of microarrays with their applications.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. **Each** question carries **15** marks. Essay type.

39. With the help of suitable diagram explain the technique of recombinant DNA technology. Briefly explain the process taking place in each step.
40. With the help of suitable diagrams, explain the structure features of pBR322 and pUC series vectors. Explain the selection strategies in both vectors in detail.
41. Describe the structural features of Yeast Artificial Chromosome vector. What are its applications?
42. What is a cDNA library? How it is constructed? Explain its applications.
43. What is PCR technique? Explain its principle with the help of necessary diagrams and mention its components.
44. How the GMOs contributed in the Agriculture, Medical and Environmental sector. Explain with proper examples.

**(2 × 15 = 30 Marks)**

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(Pages : 4)

**N – 8088**

Reg. No. : .....

Name : .....

**Fourth Semester B.Sc. Degree Examination, August 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**Core Course VI**

**BV 1447 : IMMUNOLOGY**

**(2019 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions in a word or **one** or **two** sentences. **Each** question carries **1** mark.

1. Define innate immunity.
2. What is an immunogen?
3. Give the expansion of RIA.
4. Name one disease fully eradicated due to vaccination.
5. Name a primary lymphoid organ.
6. What is an epitope?
7. Name any two COVID vaccines produced in India.
8. What is immunotherapy?

**P.T.O.**

9. Name one autoimmune disease.
10. Who is considered as the founder of vaccination?

**(10 × 1 = 10 Marks)**

SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks. (Answer not exceed **one** paragraph)

11. Write any two functions of immune system.
12. Comment on functions of antibody in an immune response.
13. Differentiate between an immunogen and an antigen.
14. What is anti-idiotypic antibody?
15. Comment on monoclonal antibody.
16. How a recombinant vaccine is made?
17. What is autoimmunity?
18. Write down the role of B cells in humoral immunity.
19. Brief the main function of antigens in an immune response.
20. Explain types of antibodies.
21. What is a hapten?
22. Explain the principle behind ELISA technique.
23. What is an attenuated vaccine?
24. What is the use of HAT medium?
25. Write briefly on Hashimoto's thyroiditis.
26. How do you get polyclonal antibodies?

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions. **Each** question carries **4** marks. (Answer not to exceed **120** words)

27. Differentiate between isotype and allotype antibodies.
28. Cite the important differences between innate and acquired immunity.
29. Write a note on principle of RIA and its applications in diagnostics.
30. Explain the importance of immunization in community health.
31. Write a note on important discoveries that led to the advent of modern immunology.
32. What is humoral immunity discoveries that led to the advent of modern immunology.
33. What is immunoelectrophoresis? Write a note on its applications.
34. Briefly describe different types of vaccines.
35. Write a note on major histocompatibility complex.
36. Write short note on B cell activation.
37. What is SLE? Write about its causes and symptoms.
38. Explain the different types of Rheumatoid arthritis; its signs and symptoms.

**(6 × 4 = 24 Marks)**

SECTION – D

Answer any **two** questions. **Each** question carries **15** marks. (Answer not to exceed **three** pages)

39. With the help of diagrams, elaborately explain the structure of an antibody molecule.
40. Answer the following
  - (a) Explain in detail the genetic basis of antibody diversity.
  - (b) Write a note on hybridoma technology.
41. What are the different types of antigen-antibody reactions? Write a note on its applications in the medical field.
42. How someone can develop an autoimmune disease? Elaborate on any three common autoimmune diseases.
43. Describe in detail the T cell-mediated immunity.
44. Write an essay on the lymphatic system in humans.

**(2 × 15 = 30 Marks)**

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Reg. No. : .....

Name : .....

Fourth Semester B.Sc. Degree Examination, August 2022

Career Related First Degree Programme under CBCSS

Group 2(b) – Biotechnology (Multimajor)

Core Course – V

BV 1444 : PHYSICAL CHEMISTRY – II

(2019 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. Each question carries **1** mark.

1. Write the *Michaelis-Menten* equation and explain the terms.
2. How is the degree of dissociation ( $\alpha$ ) of a weak electrolyte in a solution of concentration 'c' with molar conductivity  $\Lambda_m^c$  related to its limiting molar conductivity  $\Lambda_m^0$ ?
3. What is meant by steady state approximation?
4. Give an example that makes use of Tyndall effect.
5. The enthalpy change for adsorption is \_\_\_\_\_.
6. In the NMR spectrum of ethanol, which kind of proton will show absorption at the lowest field strength?
7. What is the quantum mechanical selection rule for vibrational Raman spectroscopy?

8. A linear operator ( $\hat{A}$ ) that satisfies the condition  $\int \phi (\hat{A}\psi)^* d\tau = \int \psi^* (\hat{A}\phi) d\tau$  for any two well-behaved functions is called a \_\_\_\_\_ operator.
9. Give the Onsager equation and explain the terms involved.
10. Mention an important application of the third law of thermodynamics.

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer **any eight** questions. Each question carries **2** marks.

11. Explain the intermediate compound formation theory of catalysis.
12. At 353 K, benzene and toluene form nearly ideal solution. The vapour pressures of pure benzene and toluene are 760mm and 290 mm. Calculate the total vapour pressure and vapour composition for a solution containing 0.5 mole fraction of benzene.
13. What are conjugate solutions?
14. Explain the term sedimentation potential.
15. What are associated colloids?
16. Write the Gibbs adsorption equation and explain the terms.
17. What is the potential of electrode consisting of a silver rod dipping in 0.05 M  $\text{AgNO}_3$  solution? Given  $E^\circ_{\text{Ag}^+/\text{Ag}} = 0.80$  V.
18. Define single electrode potential. Can its absolute value be determined?
19. What is Walden's rule?
20. How many normal modes of vibration does water molecule have and how many of them are IR active?
21. Explain the term partition function.
22. Sketch the schematic NMR spectrum of butanone, label the signals and explain the multiplicities.



23. What is the principle of AES?
24. What is Nernst heat theorem?
25. Explain the concept of degeneracy in quantum mechanics.
26. Given that the fundamental vibrational band for carbon monoxide is at  $2140\text{ cm}^{-1}$ . Calculate the force constant of the C-O bond.

**(8 × 2 = 16 Marks)**

### SECTION – C

Answer **any six** questions. Each question carries **4** marks.

27. Explain the stability of sols.
28. What are the limitations of Laugmuir's theory of unimolecular adsorption?
29. The EMF of the cell obtained by coupling a glass electrode and a saturated calomel electrode (SCE), both dipping in a buffer solution of pH 5, is found to be 0.1210 V. Upon replacing the buffer with a test solution, the EMF of the cell is found to be 0.4070 V. Calculate the pH of the test solution, if the potential of SCE is 0.2415 V.
30. Explain Wein effect and Debye-Falkenhagen effect.
31. What are the limitations of distribution law?
32. Calculate the ground state energy of an electron confined in a one-dimensional box of length 0.2 nm. Also calculate its energy when it is in the  $n = 4$  level.
33. Write down the Schrodinger wave equation of the H-atom in spherical polar coordinates. Indicate the origin of quantum numbers  $n$ ,  $l$  and  $m$  from the above equation.
34. Discuss the theory of fractional distillation of binary miscible liquid mixtures.
35. Discuss the significance of Franck-Condon principle in explaining the intensities of spectral lines in electronic spectroscopy.

36. Describe Hittorf's method for the determination of transport number.
37. Explain the term ensemble. Distinguish between microcanonical, canonical and grand canonical ensembles.
38. Calculate the NMR frequency of a bare proton in a magnetic field of  $51.67 \times 10^3$  gauss. Given  $g_N = 5.585$ ,  $\beta_N$  or  $\mu_N = 5.051 \times 10^{-31}$  J/G.

**(6 × 4 = 24 Marks)**

#### SECTION – D

Answer **any two** questions. Each question carries **15** marks.

39. State and explain Nernst distribution law. Give the thermodynamic derivation of the law.
40. (a) Explain how do charges originate on colloidal particles.  
(b) The volume of nitrogen required to cover the sample surface with a monolayer determined from the BET plot was found to be  $8.15 \text{ cm}^3/\text{g}$  of the adsorbent. The area occupied by one nitrogen molecule is  $16.2 \times 10^{-20} \text{ m}^2$ . Calculate the surface area per gram of the sample.
41. (a) Discuss the principle underlying potentiometric redox titrations.  
(b) The EMF of the cell with transference: Ag/AgCl/HCl (mean ionic activity = 0.01751)/HCl (mean ionic activity = 0.009049)/AgCl/Ag is 0.02802 V. The corresponding cell without transference has an EMF of 0.01698 V. Calculate the (i) the liquid junction potential (ii) the transport number of  $\text{H}^+$ .
42. State and explain the postulates of quantum mechanics.
43. Explain the term molecular partition function. Arrive at an expression for internal energy in terms of the partition function.
44. (a) Explain the rule of mutual exclusion.  
(b) The fundamental vibrational frequency of HCl is  $8.8652 \times 10^{13} \text{ s}^{-1}$ . Calculate the frequency of the first Stokes line obtained if HCl is irradiated with 436.8 nm mercury line.

**(2 × 15 = 30 Marks)**

(Pages : 3)

M – 1886

Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme Under CBCSS**

**Group 2(b) – Biotechnology (Multimajor)**

**BV 1542.1 : ECONOMIC BOTANY, ETHNOBOTANY AND MEDICINAL  
BOTANY**

**(2016 and 2017 Admission)**

Time : 3 Hours

Max. Marks : 80

- I. Answer **all** questions in **one** word or sentences.
1. Give binomial and family of Ragi.
2. What are the specific use of Asafoetida?
3. Write binomial and morphology of the useful part of Ash gourd.
4. Name a pest of coconut that damages the young buds and leaves.
5. Give the binomial and family of a plant that can be used as an insecticide.
6. Define ethnobotany
7. Name a plant that is used by the tribal communities and its specific use.
8. Expand ICAR.
9. Give the binomial and family of the source plant of Vinblastine.
10. Define crude drug.

**(10 × 1 = 10 Marks)**

P.T.O.

II. Answer **any eight** questions, Short Answer (Not to Exceed **One** Paragraph)

11. Comment on the cause symptoms and control of Blast of Paddy.
12. Give binomial and family of any 2 dye yielding plants.
13. What are the high yielding varieties of coconut, provide the recommended spacing of planting.
14. Give the binomial, family of pineapple and watermelon.
15. What are the major storage pests of paddy? Comment on its control measures.
16. What are the industrial important products that can be extracted from coconut?
17. What are the uses of Tapioca? Mention its binomial and family.
18. What are the uses of cotton? Name its source plant and family.
19. How plants are used for making shelter by tribal communities?
20. What is the role of a mediator in ethnobotanical data collection?
21. Explain the significance of Benefit sharing in traditional botanical information.
22. What is Jeevani? Provide binomial, family and properties

**(8 × 2 = 16 Marks)**

III. Short Essay (Answer **any six** questions).

23. What is the significance of ethnobotanical information in conservation?
24. How sacred groves help in conservation of pristine forests?
25. What are the major activities and role of NBGRI in conservation of medicinal plants?
26. What are the medicinal properties of *Curcuma* and *Zingiber*?

27. Comment on the Medicinal properties of any two bulbs.
28. Describe the medicinal properties of Asoka and Brahmi. Provide its binomial and family.
29. Comment on drug adulteration.
30. How pharmacognosy can be helpful in Ancient medicines Ayurveda and Sidha?
31. What are the major sources of crude drugs from plants?

**(6 × 4 = 24 Marks)**

IV. Essay (Answer **any two** questions).

32. Describe in detail the methods of cultivation, processing and economical importance of coconut.
33. Explain the role of various plants connected with tribal life.
34. What are the activities of different agencies in conservation and cultivation of medicinal plants.
35. What are the role of Pharmacognosy in modern and ancient medicine?

**(2 × 15 = 30 Marks)**

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Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) : Biotechnology (Multimajor)**

**Core Course**

**BV 1543 : ORGANIC CHEMISTRY I**

**(2014, 2016 & 2017 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. Answer in **one** word to maximum **two** sentences. **Each** question carries **1** mark.

1. What are carbenes?
2. Draw the structures of  $\alpha$ -D- fructofuranose.
3. What is the IUPAC name of the compound  $\text{CH}_3\text{--CH}_2\text{--CH}_2\text{--CH(Cl)--CH}_3$ ?
4. What is the hybridisation of carbon in cyclohexane?
5. Draw the structure of D-lactic acid.
6. What is Borsches reagent?
7. How many optical isomers are possible for D-glucose?
8. Give an example for a ketose sugar.

P.T.O.

9. Name a suitable reagent to distinguish between reducing and non-reducing sugars.
10. What is the chemical name of Freon 12?

**(10 × 1 = 10 Marks)**

SECTION – B

Short Answer type. Answer any **eight** questions. **Each** question carries **2** marks.

11. What is hydration reaction?
12. What is Soudmeyer reaction?
13. What are the uses of citric acid?
14. What is homolytic bond fission? Explain.
15. Draw the structure of the compounds
  - (a) (Z)-5-chloro-3-methylhex-2ene and
  - (b) m-dinitrobenzene.
16. What is steric effect? Explain.
17. What are diastereomers? Illustrate with an examples.
18. Suggest a suitable method for the preparation of aliphatic carboxylic acids. Illustrate with all example.
19. What are crown ethers? Give an example.
20. What is Schiff's reagent test? Explain.
21. Draw the structure of D-fructose and identify the chiral center.
22. What are the industrial applications of ethylene glycol?

**(8 × 2 = 16 Marks)**

## SECTION – C

Short essay type. Answer any **six** questions. **Each** question carries **4** marks.

23. Write a note on the preparation, properties and synthetic uses of DDT.
24. Write a note on the optical activity of biphenyls.
25. Explain the effect of substituents on the acidity of carboxylic acids.
26. Explain the mechanism and stereochemistry of  $S_Ni$  mechanism.
27. Discuss the mechanism of aromatic electrophilic substitution reactions.
28. Explain Victor Mayer's test.
29. How will you convert aldose to ketose? Explain.
30. What is mutarotation? Explain the mechanism of mutarotation.
31. Discuss about the reactivity of aldehydes and ketones.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. **Each** question carries **15** marks.

32. Discuss ascent and descent series in aliphatic carboxylic acids.
33. Discuss
  - (a) Relative and absolute configuration
  - (b) E-Z system of nomenclature of geometrical isomers.
34. Discuss
  - (a) Aldol condensation
  - (b) Epoxidation
  - (c) MPV reduction.
35. Discuss the reactivity of naphthalene.

**(2 × 15 = 30 Marks)**



(Pages : 3)

M – 1892

Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme under CBCSS**

**Group 2 (b) : Biotechnology (Multimajor)**

**Core Course**

**BV 1544 : ENVIRONMENTAL BIOTECHNOLOGY**

**(2014, 2016 & 2017 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions in a word or **one** or **two** sentences. **Each** question carries **1** mark.

1. Define bioherbicides.
2. Name two nitrogen fixing bacteria.
3. Define ecosystem.
4. What are renewable energy resources?
5. Define mycorrhiza.
6. How do microbes produce hydrogen?
7. What does the term UASB stands for?
8. What are coliforms?
9. Give an example for energy crop.
10. Why *Pseudomonas putida* is called superbug?

**(10 × 1 = 10 Marks)**

P.T.O.

## SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks. Answer not to exceed one paragraph.

11. Define methanogenesis.
12. What is biodiesel?
13. Differentiate between photosynthesis and solar cells.
14. Describe bioaccumulation.
15. Write a note on biopesticides.
16. What are xenobiotic compounds?
17. With suitable example define biommeralization.
18. Define phytoremediation.
19. Define hotspots with examples.
20. What is gasohol and what is it used for?
21. Discuss about ecological footprint.
22. What is biomass?

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** of the following. (Answer not to exceed **120** words). **Each** question carries **4** marks.

23. What is the basic scheme through which complex organic pollutants get converted to methane?
24. Discuss the action of cellulase on cellulose and its application.

25. Write short note on principles of sustainability.
26. What are the various principal pollutants polluting our environment?
27. With suitable examples explain the various types of ecosystem.
28. Differentiate between bioleaching and metal precipitation.
29. How is the BOD and COD of industrial effluents assessed?
30. What are biofertilizers? Discuss their role in agriculture.
31. Discuss the basic principles of activated sludge process for waste water treatment.

**(6 × 4 = 24 Marks)**

#### SECTION – D

Answer any **two** questions. (Not more than **three** pages) **Each** question carries **15** marks.

32. Write an essay on renewable and non-renewable resources.
33. Write an essay on the bioremediation, its principles and strategies.
34. Describe the role of biotechnology in environment protection with examples.
35. Write an essay on the methods used for the detection and enumeration of coliforms in drinking water.

**(2 × 15 = 30 Marks)**

(Pages : 3)

M – 1893

Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**Core Course - X**

**BV 1545 : PLANT BIOTECHNOLOGY AND ANIMAL BIOTECHNOLOGY**

**(2014, 2016 & 2017 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in a word or **one** or **two** sentences. **Each** question carries **1** mark.

1. What is subprotoplast?
2. Write the main function of auxin in plant tissue culture media.
3. What is embryo culture?
4. Use of gibberellic acid.
5. What is ovule culture?
6. What is multipotent stem cell?
7. Name some growth hormones.
8. What is Interleukin?

P.T.O.

9. Define Biohazards.

10. What is Proinsulin?

**(10 × 1 = 10 Marks)**

#### SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks. (Answer not to exceed **one** paragraph).

11. What are plant growth regulators?

12. Define Somatic embryogenesis.

13. Define Organ Culture.

14. What is Microinjection?

15. Define Biosensor.

16. Write notes on Edible vaccines.

17. Discuss about established cell line.

18. Describe the types of stem cell.

19. Write about Embryonic stem cells and its uses.

20. Discuss Polyclonal antibodies.

21. Define Auto and isograft.

22. Define Xeno and Allograft.

**(8 × 2 = 16 Marks)**

#### SECTION – C

Answer any **six** questions. **Each** question carries **4** marks. (Answer not to exceed **120** words).

23. Write a brief note on Selection and isolation of monoclonal variation.

24. Explain any one of the transgenic plant production.

25. Write the Scope and importance of tissue culture.
26. Describe about the Biological method of gene transfer in plants.
27. Write brief notes on Edible vaccine from plants.
28. Write about the Scope and application of animal tissue culture.
29. Describe about Primary cell lines and their advantages.
30. How do you prepare tissue extract?
31. Explain Production of human insulin from animal cell culture.

**(6 × 4 = 24 Marks)**

SECTION – D

Answer any **two** questions. **Each** question carries **15** marks. (Answer not to exceed **3** pages).

32. Explain in detail about various disaggregation methods of animal tissue.
33. Write an essay on human somatic cell gene therapy.
34. Explain in detail about the Production of haploids using the following culture.
  - (a) Anther culture
  - (b) Microspore culture
  - (c) Ovule culture
35. Write an essay on the advantages and disadvantages of transgenic plants in Agriculture and Horticulture.

**(2 × 15 = 30 Marks)**

(Pages : 4)

M – 1894

Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme Under CBCSS**

**Group 2(b) : Biotechnology (Multimajor)**

**BV 1542.1 : ECONOMIC BOTANY, ETHNOBOTANY AND MEDICINAL  
BOTANY**

**(2018 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer all questions in a word or one or two sentences. Each question carries 1 mark. Draw diagrams only if specified in the question.

1. Botanical name of Coconut.
2. Morphology of useful part of paddy.
3. Give the botanical name of apple
4. Coffee belongs to the family \_\_\_\_\_
5. What is the botanical name of ash gourd?
6. Mention the botanical name and family of Wheat
7. Define adulterant
8. Name any two plants used by tribal as the source of shelter

P.T.O.

9. Expand ICAR
10. What are sacred groves?

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer **any eight** questions. **Each** question carries **2** marks. Answer not to exceed one paragraph.

11. What are the importance of sacred groves in conservation?
12. Comment on the uses of neem.
13. Give the botanical name and family of tomato
14. Mention the morphology of useful part of pepper and cardomom
15. Give the botanical name and family of sesame
16. Mention any two pulses
17. List any two importance of ethnobotany in drug discovery
18. Comment on the uses of *Allium cepa*
19. Comment on *Trichopus zeylanicus*
20. Mention the medicinal uses of *Adhatoda vasica*
21. Comment on the uses of *Acorus calamus*
22. Name any two tribes of India
23. What the medicinal importance of Aswagandha
24. Give the botanical name of Asoka and Brahmi
25. Comment on Acupuncture
26. What is the botanical name and Family of Sarpagandha?

**(8 × 2 = 16 Marks)**



## SECTION – C

Answer **any six** of the following. (Answer not to exceed **120** words) **Each** question carries **4** marks.

27. Explain the cultivation process of coconut.
28. Give the botanical name and family of Basil, and Henna
29. What is 'Jeevani'?
30. Comment on the scope of ethnobotany
31. What are the importance of sacred groves in plant conservation?
32. Mention the importance of plants in the healthcare of tribals.
33. What are the importance of NBGRI in conservation?
34. What is the economic importance of Sarpagandha?
35. Comment on the uses of *Cynodon dactylon*
36. What are the medicinal values of *Withania*?
37. What are the medicinal importance of *Andrographis paniculata*?
38. Give a brief account on various methods for the collection of ethnobotanical data.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer **any two** questions. (not more than three pages). **Each** question carries **15** marks.

39. Give the botanical name family and morphology of useful part of Snake gourd, sugar cane, Coffee, Sesame, Tapioca and curcuma.
40. Write an essay on the extraction process herbal drugs.
41. Write an essay on source of crude drugs

42. Discuss ethnobotany and drug discovery with suitable examples
43. What are the importance of ethnobotany in conservation of plants?
44. Give a brief note on ancient and modern systems of medicines

**(2 × 15 = 30 Marks)**

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(Pages : 4)

M – 1895

Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme under CBCSS**

**Biotechnology (Multimajor)**

**Core Course**

**BV 1541.2 : SYSTEMATICS, BIODIVERSITY AND ANIMAL BEHAVIOUR**

**(2018 Admission)**

Time : 3 Hours

Max. Marks : 80

Draw diagrams wherever necessary.

I. Answer **all** questions in one or two sentences. Each question carries **1** mark.

1. What is trinomial nomenclature?
2. What is phenon?
3. What is tree of life?
4. Define endemism.
5. Who introduced the concept of biodiversity hotspots?
6. Who discovered waggle dance as a mode of communication in honey bees?
7. What is IRM?
8. Who coined the term operant learning?
9. What is nuptial flight?
10. What are alarm pheromones?

**(10 × 1 = 10 Marks)**

P.T.O.

II. Answer **any eight** of the following questions. Each question carries **2** marks.  
(Not to exceed one paragraph)

11. What is ICZN?
12. Explain the concept of species and subspecies.
13. What are keystone species?
14. Comment on gamma diversity.
15. What is invasive alien species?
16. Comment on Red data book.
17. What is fixed action pattern?
18. Briefly explain care soliciting behaviour with example
19. Comment on allelomimetic behaviour.
20. Briefly explain filial imprinting.
21. Explain the action of fight and flight hormone.
22. Comment on pineal gland
23. What are least concerned species
24. Comment on genetic diversity
25. What is stimulus filtering?
26. Comment on phenetics.

**(8 × 2 = 16 Marks)**

III. Answer **any six** of the following questions. Each question carries **4** marks.  
(Not to exceed **120** words)

27. Give an account on molecular systematics.
28. Explain Eastern Himalayas as a biodiversity hotspot.
29. Briefly describe the various IUCN categories.
30. Differentiate between agonistic and eliminative behaviour in animals with examples.
31. Give an account on classical conditioning with experimental proof.
32. Compare instinct and learning with proper examples.
33. Explain the significance of biological clocks in animals.
34. Differentiate between altruism and eusociality.
35. Comment on the social system in elephants.
36. Give a brief account on nomenclature.
37. What are the threatened categories of species?
38. Give an account on Convention on Biological Diversity.

**(6 × 4 = 24 Marks)**

IV. Answer **any two** of the following questions. Each question carries **15** marks.

39. Elaborate the procedures and rules of taxonomy.
40. Write an essay on the current threats of biodiversity.

41. Define motivation and describe the models of motivation with suitable diagrams.
42. Give an account on pheromones with special reference to their types and significance.
43. Explain instinctive behaviour with special reference to its comparison with learning.
44. Give an account of the biodiversity of India.

**(2 × 15 = 30 Marks)**

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(Pages : 4)

**M – 1896**

**Reg. No. :** .....

**Name :** .....

**Fifth Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme Under CBCSS**

**Biotechnology (MultiMajor)**

**Core Course**

**BV 1542. 2 – GENETICS**

**(2018 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** the questions in a word or one to two sentences. Each question carries **1** mark. (Draw diagrams only if specified in the question).

1. Transposable elements.
2. Hypostatic gene.
3. Complete linkage.
4. Exons.
5. Sex limited genes.
6. Law of dominance.
7. Knockout gene.
8. Pleiotropism.

**P.T.O.**

9. Overlapping genes.
10. Test Cross.

**(10 × 1 = 10 Marks)**

SECTION – B

Answer **any eight** questions. Each question carries **2** marks. (Answer not to exceed one paragraph)

11. Sickle cell anemia.
12. Sex chromosome anomalies.
13. Differentiate genotype and phenotype.
14. Eugenics.
15. Differentiate spontaneous and induced mutations.
16. Incomplete dominance.
17. Characteristics of multiple alleles.
18. Sickle cell anemia is caused by single-nucleotide polymorphism Justify.
19. Chromosome theory of Heredity.
20. Frame shift mutations.
21. Draw any six symbols used in Human pedigree analysis.
22. Pseudo genes.
23. Alkylating agents.



24. Barr body.
25. Euploidy.
26. Characters selected by Mendel.

**(8 × 2 = 16 Marks)**

SECTION – C

Answer **any six** questions. (Answer not to exceed **120** words) Each question carries **4** marks.

27. Inheritance of ABO blood group alleles.
28. Write note on any four genetic disorders in man caused by chromosomal abnormalities.
29. Role of Hox gene in the development.
30. Chemical mutagens.
31. Sex limited and sex influenced genes.
32. Chromosome mapping.
33. Inborn errors of metabolism.
34. Comment on epistasis.
35. Mechanism of crossing over.
36. Comment on the molecular basis of gene mutation.
37. Incomplete dominance.
38. Principle of segregation with example.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer **any two** questions. (Not more than **3** pages) Each question carries **15** marks.

39. Explain polygenic inheritance and complementary genes.
40. Write an essay on linkage with suitable examples.
41. Elucidate Mendel's dihybrid cross, explain law of independent assortment.
42. Write an essay on Chromosome theory of sex determination citing suitable examples.
43. Elucidate extra chromosomal inheritance.
44. Human chromosomes categories.

**(2 × 15 = 30 Marks)**

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(Pages : 4)

M – 1897

Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**Core Course**

**BV 1543 : ORGANIC CHEMISTRY — I**

**(2018 and 2019 Admission)**

Time : 3 Hours

Max. Marks : 80

PART – A

Answer **all** questions. Answer in **one** word to maximum **two** sentences. Each question carries **1** mark.

1. What is Lucas' reagent?
2. Draw the structures of  $\alpha$ -D- fructofuranose.
3. What will be the product formed when a secondary alcohol is treated with Jones reagent?
4. Draw the structure of meso-tartaric acid.
5. What are carbanions?
6. Give an example for a neutral nucleophilic.

P.T.O.

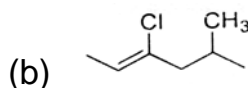
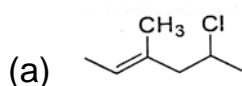
7. What is the state of hybridisation of carbon in ethene?
8. How many optical isomers are possible for a compound containing four chiral carbons?
9. What is Borsches reagent?
10. What is the IUPAC name of the compound  $\text{CH}_3 - \text{CH}_2 \text{CH}(\text{Cl}) - \text{CH}_3$  ?

**(10 × 1 = 10 Marks)**

### PART – B

Short answer type. Answer **any eight** questions. Each question carries **2** marks.

11. Give the IUPAC name for the compounds



12. What is an E1 reaction?
13. What is Markownikoff's rule? Explain with an example.
14. What is meant by heterolytic bond fission? Explain.
15. Why t-butylbromide is highly moisture sensitive?
16. What is epoxidation? Explain with an example.
17. How aryl chlorides are prepared?
18. What is electromeric effect?
19. How anthraquinone is prepared?

20. What are epimers?
21. How phenol is converted to salicylic acid?
22. What is the product obtained when benzene is first nitrated and then chlorinated? Justify.
23. How will you distinguish between aldehydes and ketones? Explain.
24. Which conformation of n-butane is more stable? Why?
25. What are the industrial application of cellulose?
26. What is Williamson's synthesis?

**(8 × 2 = 16 Marks)**

### PART – C

Short essay type. Answer **any six** questions. Each question carries **4** marks.

27. What, is hyperconjugation? How does it influence stability of carbocations? Explain.
28. How is vanillin prepared? What are its uses?
29. Differentiate between singlet carbene and triplet carbene.
30. What is Huckel's rule? How it is used to explain the aromaticity of tropylium cation and cyclopentadienyl anion.
31. Write a note on the optical activity of biphenyls.
32. Discuss the elimination - addition mechanism in aromatic nucleophilic substitution.
33. Explain the orienting effect of substituents in aromatic electrophilic substitution reactions.
34. Explain the mechanism and stereochemistry of  $S_Ni$  mechanism.

35. Write a note on Cannizarro reaction and Aldol condensation.
36. How will you convert fructose to glucose?
37. Write a note on absolute alcohol and power alcohol.
38. Discuss the preparation and industrial importance of ethylene glycol.

**(6 × 4 = 24 Marks)**

#### PART – D

Answer **any two** questions. Each question carries **15** marks.

39. Discuss the various methods for elucidating a reaction mechanism.
40. Discuss the preparation, properties and synthetic uses of vinyl chloride, chloroprene and DDT.
41. Discuss
  - (a) E-Z system of nomenclature of geometrical isomers
  - (b) Conformational analysis of cyclohexane.
42. Discuss
  - (a) Crossed aldol condensation
  - (b) Benzoin condensation
  - (c) Clemmenson reduction.
43. Discuss the reactivity and orientation in aromatic electrophilic substitution reactions of naphthalene.
44. Discuss
  - (a) Acidity of phenols and its comparison with alcohols and acids
  - (b) Industrial Importance of benzyl alcohol and nitro phenols.

**(2 × 15 = 30 Marks)**

(Pages : 4)

**M – 1898**

Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme Under CBCSS**

**Group 2(b) – Biotechnology (Multimajor)**

**BV 1544 — ENVIRONMENTAL BIOTECHNOLOGY**

**(2018 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** the questions in a word or **one** or **two** sentences. **Each** question carries **1** mark.

1. Name two air pollutants.
2. What are Coliforms?
3. Name a plant oil used as energy crop.
4. What is biogas fermentation?
5. Define biomineralisation.
6. Give an example for endemism.
7. What are algal blooms?
8. Name a nitrogen fixing bacteria.

**P.T.O.**

9. What is the process of bioleaching?
10. Give an example for a non-renewable energy resource.

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks. (Answer not to exceed **one** paragraph)

11. What are fossil fuels?
12. Explain Chemical Oxygen Demand.
13. What are biopesticides?
14. Define biodiversity.
15. What is radioactive fallout?
16. How do microorganisms affect food quality?
17. What is the importance of mycorrhiza?
18. List any four major water pollutants.
19. Mention any two microbes used in biomass fuel production.
20. What is bioaccumulation?
21. How is biotechnology used in improving the environment?
22. What is gasohol?
23. Mention the importance of biosphere.
24. What is species diversity?
25. How do petrochemicals affect the environment?
26. What are energy crops?

**(8 × 2 = 16 Marks)**



## SECTION – C

Answer any **six** questions. **Each** question carries **4** marks. (Answer not to exceed **120** words)

27. Comment on vegetable oils used as engine fuels.
28. Explain the biological method of controlling pests.
29. What are the characteristics of a grassland ecosystem?
30. How does BOD affect aquatic life?
31. Brief a note on domestic waste? Give examples.
32. Explain the process of biogas production.
33. Discuss bioassessment measures to sustain environmental quality.
34. What is the importance of conducting microbial analysis on water?
35. Discuss the different categories of bioherbicides.
36. Mention the advantages of non-conventional energy resources.
37. Discuss the importance of *Bacillus thuringiensis* in environmental biotechnology.
38. Mention any two types of waste water treatment.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. **Each** question carries **15** marks. (Answer not to exceed **three** pages)

39. Define bioremediation. Discuss the role of microbes in bioremediation.
40. Discuss the application of microbes in fuel production from biomass.

41. Write an essay on conventional source of energy and their impact on environment.
42. Discuss the use of biotechnology in the treatment of hazardous industrial effluents.
43. What is solid waste? Discuss the causes and effects of solid waste.
44. Give an account on applications of biotechnology in agriculture.

**(2 × 15 = 30 Marks)**

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(Pages : 4)

**M – 1899**

Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) — Biotechnology (Multimajor)**

**BV 1545 : PLANT BIOTECHNOLOGY AND ANIMAL BIOTECHNOLOGY**

**(2018 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** the questions in a **word** or **one** or **two** sentences. **Each** question carries **1** mark.

1. What are stem cells?
2. Name the chelating agent used in MS medium.
3. What are transformed cell lines?
4. Name a transgenic plant.
5. Define micropropagation.
6. What is shoot tip culture?
7. Which is the first human cell line to grow in culture?
8. What are embryonic stem cells?

**P.T.O.**

9. Name a chemical inducing protoplast fusion.
10. What are roller bottles?

**(10 × 1 = 10 Marks)**

SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks. (Answer not to exceed **one** paragraph)

11. What are the components of animal cell culture media?
12. Differentiate between polyclonal and monoclonal antibodies.
13. What is hairy root culture?
14. What is the advantage of meristem culture?
15. What are edible vaccines?
16. Comment on cell line characterization.
17. What is the role of cytokinin in plant tissue culture?
18. Define germ line gene therapy.
19. What are transgenic plants?
20. Why plant tissue culture is considered as 'clonal multiplication'?
21. What is the use of spinner flasks in cell culture?
22. Explain particle gun delivery method.
23. What are somatic hybrids? What is its significance?
24. Mention the use of haploids in crop improvement.
25. Explain tumor formation in plants by *Agrobacterium tumefaciens*.
26. What is the significance of cryopreservation in animal cell culture?

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions. **Each** question carries **4** marks. (Answer not to exceed **120** words)

27. Give an account on clinical applications of stem cell technology.
28. Elaborate on the applications of plant tissue culture.
29. Explain the procedure of protoplast isolation.
30. Differentiate dedifferentiation and redifferentiation.
31. Brief a note on animal cell culture products.
32. What is anther culture? What is its significance?
33. Comment on the importance of growth factors in cell culture.
34. How can plant cells be transformed by virus mediated gene transfer?
35. Explain somaclonal variation.
36. Write a note on secondary metabolite production in plants by tissue culture.
37. Differentiate between primary and secondary cell culture.
38. Explain the production of vaccines in animal cells.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. **Each** question carries **15** marks. (Answer not to exceed **three** pages)

39. Discuss on the applications of animal tissue culture in biomedical research.
40. Explain how asepsis is achieved at various stages of plant tissue culture.
41. Write an essay on bioreactors used for the scaling up of suspension cultures.

42. Describe the process of somatic embryogenesis followed by organogenesis in plant tissue culture.
43. What is biopharming? Discuss the production of therapeutic proteins in transgenic plants.
44. What are somaclonal variations? How it is produced? Discuss its applications in crop improvement.

**(2 × 15 = 30 Marks)**

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(Pages : 4)

**M – 1903**

**Reg. No. :** .....

**Name :** .....

**Fifth Semester B.Sc. Degree Examination, December 2021.**

**Career Related First Degree Programme under CBCSS**

**Group 2 (b) – Biotechnology (Multimajor)**

**Core Course**

**BV 1541.1 – ANGIOSPERM MORPHOLOGY AND SYSTEMATICS BOTANY**

**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

**PART – A**

Answer **all** questions in one word to maximum of **2** sentences.

1. What is a drupe?
2. Who proposed sexual system of Classification?
3. Expand ICN.
4. What is meant by holotype?
5. Which family shows peeling of bark?
6. Name the family possess Parietal placentation.
7. Define aestivation.
8. Which genus possess cyathium inflorescence?

**P.T.O.**

9. What is epigyny?
10. Name the family having interpetiolar stipule.

**(10 × 1 = 10 Marks)**

**PART – B**

Answer **any eight** questions in not more than one paragraph.

11. What are albuminous seeds?
12. Comment on dydinamous condition.
13. What do you mean by valid publication?
14. Comment on Botanical gardens.
15. Distinguish between apocarpy and syncarpy. Cite examples for each.
16. What do you mean by Phylogenetic classification?
17. What are semantides? Give example.
18. Give an account on economic importance of the members of arecaceae.
19. Explain the male reproductive structure in Cucurbitaceae.
20. Compare legume and lomentum?
21. Comment on the position of gymnosperms in Bentham and Hooker's system of classification.
22. What are plesiomorphic characters?
23. Explain vexillary aestivation with diagram.
24. Why is poisoning of Hebarium important?



25. What are lodicules? In which family do you find them?
26. Explain rule of priority

**(8 × 2 = 16 Marks)**

### PART – C

Answer **any six** questions in not more than **120** words

27. Write an account on the dicot family with pollinia.
28. What is the importance cytotaxonomy?
29. Point out the principles of ICBN.
30. How do the relationship among taxa are assessed using numerical taxonomy? Explain using various indices.
31. Asteraceae is considered as an advanced family. Justify the statement.
32. Explain helicoid and scorpioid cyme with examples and proper diagram.
33. Comment on the advantages and disadvantages of Engler and prantle system of classification.
34. Write an account on the diagnostic features of the family Annonaceae.
35. Briefly explain the contribution of Linnaeus towards plant taxonomy.
36. Explain the various steps involved in the preparation of Herbarium.
37. Write an account on two Major Botanical Gardens of Kerala.
38. Point out the principles of Numerical Taxonomy.

**(6 × 4 = 24 Marks)**

PART – D

Answer **any two** questions

39. Write a detailed account on the special type of inflorescence with illustrations.
40. Explain various types of placentation with diagrams.
41. Compare the floral characters found in subfamilies of Fabaceae.
42. Outline the classification proposed by Bentham and Hooker. Discuss on the position of Gymnosperms and Orchidaceae.
43. Explain detail about the classification of simple fruits with examples.
44. Compare any two families under monoclamydeae.

**(2 × 15 = 30 Marks)**

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(Pages : 4)

M – 1905

Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2021.**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) – Biotechnology (Multimajor)**

**Core Course**

**BV 1542.1 – ECONOMICS BOTANY, ETHNOBOTANY AND MEDICINAL  
BOTANY**

**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in a word or **one or two** sentences. Each question carries **1** mark.

1. What is the botanical name of pineapple?
2. Mention the use of asafoetida.
3. Name the family of Coffee.
4. Mention any use of *Aegle marmelos*.
5. What is the morphology of the economically important part in Tapioca?
6. Expand ICAR.
7. What is the active principle in *Curcuma longa*?

P.T.O.

8. Comment on the medicinal value of sarpagandha.
9. Write the binomial of a sugar yielding plant.
10. Write down the binomial of an insecticide yielding plant.

**(10 × 1 = 10 Marks)**

SECTION – B

Answer **any eight** questions. Each question carries **2** marks.

11. Write the binomial and family of apple.
12. Name the morphology of the source of two dye yielding plants.
13. Write on the morphology of *Citrus* and Watermelon.
14. Name the source of asafoetida.
15. State the importance of *Ficus religiosa*?
16. What is the role of IMPB?
17. Describe the importance of primeval forest.
18. Write on the medicinal importance of *Adhatoda vasica*.
19. What is Unani medicines used for?
20. Write a brief note on drug adulteration.
21. What is the principle of Homeopathy?
22. Comment on the origin of Ayurveda.
23. Write the medicinal importance of *Acorus calamus*.
24. What is the medicinal importance of Aloe vera?
25. Define a crude drug. Write one example.
26. What is folk medicine used for?

**(8 × 2 = 16 Marks)**

### SECTION – C

Answer **any six** questions. Each question carries **4** marks.  
(Answer not to exceed **120** words)

27. Write a detailed account on economic importance of Coconut.
28. What is ethnobotanical documentation?
29. Explain various aspects of Coffee.
30. Discuss the importance of *Trichopus zeylanicus*.
31. Comment on plant resource management.
32. Write a short account on BSI.
33. Discuss the role of NBPGR in conservation of plants.
34. What is the principle of allopathic medicine?
35. Comment on Acupuncture.
36. Write on the medicinal value of onion and garlic.
37. State the importance of *Hemidesmus indicus*.
38. Give a short account on the plant parts used by tribes for shelter and food.

**(6 × 4 = 24 Marks)**

### SECTION – D

Answer **any two** questions. Each question carries **15** marks. (Answer not to exceed **3** pages)

39. Write a detailed account on the utility of vegetables and fruits studied.
40. What is Ethno botany? Write on its scope and significance.
41. What are sacred groves? Discuss its role in biodiversity conservation.

42. With examples write on the sources of crude drugs.
43. Write on the medicinal value of *Asoka*, *Brahmi*, *Aloe* and *Asparagus*.
44. Write a detailed account on any two spices and oil yielding plants.

**(2 × 15 = 30 Marks)**

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**M – 1908**

Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme Under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**Core Course**

**BV 1544 ENVIRONMENTAL BIOTECHNOLOGY**

**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** the questions in **a word** or **one** or **two** sentences. Each question carries **1** mark.

1. What is phytoremediation?
2. Define ecological diversity.
3. What are HABs?
4. Give an example for a biofertilizer.
5. What is biomass?
6. Name a plant oil used as energy crop.
7. What is bioleaching?
8. Give an example for a non-renewable energy resource.

**P.T.O.**

9. What is COD?
10. Name two air pollutants.

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer any **eight** questions. Each question carries **2** marks. (Answer not to exceed **one** paragraph)

11. What is biological nitrogen fixation?
12. List any four major water pollutants.
13. What is the impact of coal combustion on environment?
14. Write the economic importance of methanogenic bacteria.
15. Comment on biosensors.
16. What is the importance of mycorrhiza?
17. Explain biological control of pests and insects.
18. How do petrochemicals affect the environment?
19. Mention any two microbes used in biomass fuel production.
20. What are biopesticides?
21. Discuss bioassessment measures to Sustain environmental quality.
22. How is gasohol produced?
23. What is a smog?



24. What are fossil fuels?
25. Explain the role of biofertilizers in crop improvement.
26. Comment on community waste.

**(8 × 2 = 16 Marks)**

SECTION – C

Answer any **six** questions. Each question carries **4** marks. (Answer not to exceed **120** words)

27. Discuss the impact of conventional fuels on environment.
28. What are biodegradable pollutants? Give examples.
29. Explain the importance of biodiversity in sustaining life.
30. Give an account on biomineralisation.
31. Brief a note on air quality standards.
32. What are the components of biosphere?
33. How is biotechnology used in improving the environment?
34. Brief a note on vegetable oils used as engine fuels.
35. How does BOD affect aquatic life?
36. How do agricultural waste harm the environment?
37. Comment on energy crops.
38. Discuss the importance of *Bacillus thuringiensis* in environmental biotechnology.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. Each question carries **15** marks. (Answer not to exceed **three** pages)

39. What is Biogas? Explain the steps and process of biogas production.
40. Define bioremediation. Discuss the role of microbes in bioremediation.
41. What is pollution? Explain in detail the various sources of pollution.
42. Write an essay on non-conventional energy sources. Add a note on its advantages.
43. Discuss the treatment measures for municipal wastes and hazardous industrial effluents.
44. Give an account on applications of biotechnology in agriculture.

**(2 × 15 = 30 Marks)**

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(Pages : 4)

**M – 1909**

Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2021**

**Career Related First Degree Programme under CBCSS**

**Group 2 (b) : Biotechnology (Multimajor)**

**Core Course**

**BV 1545 : PLANT BIOTECHNOLOGY AND ANIMAL BIOTECHNOLOGY**

**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** the questions in **a** word or **one** or **two** sentences. Each question carries **1** mark.

1. Define Totipotency.
2. What is the role of myo-inositol?
3. Name any two plant growth regulators used in plant tissue culture.
4. What are the agents used in dry sterilization?
5. What are the commonly used surface sterilization agents?
6. Comment on Primary cell culture.
7. Brief a note on commonly used medium for animal cell culture.
8. What is Carbon dioxide incubator?

**P.T.O.**

9. Comment on Spinner flasks.
10. Mention the use of Hybridoma technique.

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer any **eight** questions. Each question carries **2** marks. (Answer not to exceed one paragraph).

11. What is Kinetin? What is its role?
12. What is Hairy root culture?
13. Define Organogenesis.
14. What is meant by Somaclonal variation?
15. Brief a note on Somatic hybridization.
16. What are the physical methods of gene transfer in plants?
17. Comment on the role of *Agrobacterium tumefaciens*.
18. What is 'Biopharming'?
19. How Immortalized cell culture is generated?
20. What is the role of Interferon?
21. How Edible vaccines are produced?
22. What are the salient features of a Stem cell?
23. Mention the growth factors used in animal cell culture.
24. How Cell suspension cultures are maintained?

25. Comment on Metabolic engineering and its applications?
26. What is another culture?

**(8 × 2 = 16 Marks)**

### SECTION – C

Answer any **six** questions. Each question carries **4** marks. (Answer not to exceed **120** words)

27. Give a short note on MS media and its major components.
28. Write a short summary on the sterilization methods used in *in vitro* culture.
29. Write a brief note on embryo culture and its significance.
30. Explain briefly the steps in micropropagation.
31. Briefly explain how a shoot tip culture is established *in vitro*.
32. What are the reasons for somaclonal variations? Add a note on its significance.
33. Briefly explain the main steps in the isolation of protoplasts.
34. Comment on — *Agrobacterium*, nature's own plant genetic engineer.
35. How virus can be used for gene transfer? What are the steps involved?
36. Comment on 'Edible vaccines' and its uses.
37. What are the contributions of transgenic techniques in agriculture?
38. What are monoclonal antibodies? What are its clinical uses?

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. Each question carries **15** marks. (Answer not to exceed **3** pages)

39. What are stem cells? Explain the methods of stem cell culture and its clinical uses.
40. Explain how secondary metabolites are produced in *in vitro* culture.
41. Write an essay on metabolic engineering of plants and its achievements.
42. What are bioreactors? How they are used in scaling up of animal cell culture?
43. Write an essay on the basic principles of plant tissue culture and its uses.
44. Explain how stress-resistant plants are produced by Genetic engineering. Give suitable examples.

**(2 × 15 = 30 Marks)**

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P – 2943

Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2022**

**Career Related First Degree Programme under CBCSS**

**Biotechnology (Multimajor)**

**Core Course VII**

**BV 1543 : ORGANIC CHEMISTRY – I**

**(2013 – 2017 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. Answer in **one** word to maximum of **two** sentence. Each question carries **1** marks.

1. What are carbocations?
2. Name two groups which show – I effect.
3. State Huckel's rule of aromaticity.
4. Give an example each for an ortho-para directing group and a meta directing group.
5. What is PCC? What is its special use?
6. Which is more acidic-Phenol or para nitro phenol? Justify.
7. What are crown ethers? Give an example.
8. What are meso compounds?

P.T.O.

9. What is meant by resolution of a racemic mixture?
10. What is the product obtained when glucose is heated for a long time with concentrated HI and red phosphorous?

**(10 × 1 = 10 Marks)**

SECTION – B

Short Answer type. Answer any **eight** questions. **Each** question carries **2** marks.

11. What is meant by Kharasch effect? Give an example to illustrate it.
12. What is meant by ozonolysis?
13. What is meant by Friedal-Craft alkylation reaction?
14. How does benzene undergo sulphonation and what is the product obtained?
15. Write one method of preparation of phenol from chlorobenzene.
16. Give the equation for the formation of the mixed aldol from acetone and formaldehyde.
17. What happens when cinnamic acid is heated with dry soda lime?
18. Mention any four important uses of citric acid.
19. Give an example for asymmetric synthesis.
20. Draw the structure of maleic and fumaric acids. How can they be distinguished?
21. What is meant by mutarotation?
22. What are anomers?

**(8 × 2 = 16 Marks)**

SECTION – C

Short Essay type. Answer any **six** questions. **Each** question carries **4** marks.

23. Write the  $S_N1$  and  $S_N2$  mechanisms of aliphatic nucleophilic substitution reaction.
24. Explain the elimination-addition mechanism of aromatic nucleophilic substitution reaction.



25. Explain the Lucas test to distinguish between primary, secondary and tertiary alcohols.
26. Discuss the effect of substituents on acidity of aromatic carboxylic acids.
27. Explain the following with regard to their significance in the chemistry of aldehydes and ketones (a) Tollen's test (b) Fehling test.
28. Distinguish between the terms enantiomers and diastereomers.
29. Write a note on the optical activity of biphenyls.
30. Discuss the structure of sucrose.
31. Write any four industrial applications of cellulose.

**(6 × 4 = 24 Marks)**

#### SECTION – D

Answer any **two** questions. **Each** question carries **15** marks.

32. Discuss and illustrate the significance of the various electron displacement effects in organic molecules.
33. Discuss the ascent and descent series in aliphatic carboxylic acids.
34. Explain the following.
  - (a) Benzoin condensation reaction
  - (b) Hydroboration reaction
  - (c) cis-hydroxylation
  - (d) Clemenson reduction
  - (e) Wolf-Kishner reduction.
35. Explain with suitable equations how the following conversions can be effected :
  - (a) glucose to fructose
  - (b) fructose to glucose.

**(2 × 15 = 30 Marks)**

Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) : Biotechnology (Multimajor)**

**Core Course**

**BV 1545 : PLANT BIOTECHNOLOGY AND ANIMAL BIOTECHNOLOGY**

**(2013 – 2017 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions in **one** word or sentence.

1. How can we generate virus free plants?
2. Name a media used in animal cell culture.
3. How can we sterilize explant?
4. What is bicarbonate buffer?
5. Name a technique used for producing transgenic dicot plants.
6. Define polyclonal antibody.
7. What are artificial seeds?
8. Explain fed batch culture.

9. Comment on biolistics.
10. What are embryonic stem cells?

**(10 × 1 = 10 Marks)**

SECTION – B

Answer any **eight** questions, Short answer (Not to exceed **one** paragraph)

11. How recombinant insulin can be produced?
12. How animal cell cultures are stored for future use?
13. What is metabolic engineering?
14. What are the use of spinner flasks?
15. Name two chemical methods of gene transfer in plants.
16. What are secondary cell culture?
17. How protoplasts are isolated from plants?
18. What are anchor dependent cells?
19. What is embryo rescue technique? State its applications.
20. What are vacuum filters?
21. What is somatic embryogenesis?
22. Comment on the use of Phenol red in animal cell culture media.

**(8 × 2 = 16 Marks)**

SECTION – C

Answer any **six** questions. **Each** question carries **4** marks. (Answer not to exceed **120** words).

23. Comment on wet sterilization.
24. Discuss the applications of stem cells.

25. What is somatic hybridization?
26. List the components and applications of vacuum desiccator in anaerobic culture.
27. Discuss the applications of tissue culture in production of therapeutic proteins.
28. Explain the method of production of monoclonal antibodies.
29. How diseases tolerant plants can be created?
30. Discuss hairy root culture and secondary metabolite production.
31. What is crown gall disease? State the practical implications.

**(6 × 4 = 24 Marks)**

SECTION – D

Answer any **two** questions. **Each** question carries **15** marks. (Answer not to exceed **three** pages)

32. Discuss various methods of gene transfer in plants.
33. Explain the technique of stem cell culture. Discuss its ethical implications.
34. Discuss various methods of sterilisation in plant tissue culture.
35. Explain how various human therapeutics can be created by animal cell culture.

**(2 × 15 = 30 Marks)**

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P – 2946

Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2 (b) : Biotechnology (Multimajor)**

**BV 1542.1 : ECONOMIC BOTANY, ETHNOBOTANY AND MEDICINAL  
BOTANY**

**(2018 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** the questions in a word or **one** or **two** sentences. Each question carries **1** mark.

1. Name any of the four tribal groups belonging to Kerala state.
2. Expand and define AYUSH.
3. What are economic plants?
4. Expand NMPB.
5. Define ethnobotany.
6. Which part of *Curcuma longa* is used as spice?
7. Define percolation technique.
8. Give any two methods of classification of drugs.

P.T.O.

9. Give any two uses of *Acorus calamus*.
10. Name any two indigenous system of medicine.

(10 × 1 = 10 Marks)

SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks. (Answer not to exceed **one** paragraph).

11. Give any two uses of *Bacopa monnieri*.
12. Explain Unani system of medicine.
13. Comment on major plant parts used by tribes for shelter and agriculture.
14. Write the botanical name, family, important plant part and traditional uses of 'Ashwagandha'.
15. Give any two chemical constituents of Sarpagandha.
16. Write two economic importance of jute.
17. Comment on dye yielding plants.
18. Give physical methods of drug evaluation.
19. What are natural insecticides? Give example.
20. Write the morphology and useful parts of *Aloe vera*.
21. What is beverage? Describe the morphology and processing of coffee.
22. Name two plants used for coffee production.
23. Give the importance of botanical resources.
24. Differentiate between Homeopathy and Allopathy.

25. Give the binomial and family of a plant which yield both oil and fibre of commercial importance.
26. What is meant by adulteration of drugs?

**(8 × 2 = 16 Marks)**

SECTION – C

Answer any **six** questions. **Each** question carries **4** marks. (Answer not to exceed **120** words)

27. Write a note on the contributions of BSI and ICAR in conservation and cultivation of medicinal plants in India.
28. Describe various methods and techniques used in Ethnobotany for the field level activities of data collection.
29. Explain methods of cultivation and uses of Adathoda.
30. Write short notes on storage of crude drugs.
31. Give distribution, cultivation, microscopic characters and uses of clove.
32. Explain the scope and applications of Pharmacognosy.
33. Write short notes on garbling and drying of herbal drugs.
34. Explain the importance and need for conservation of sacred groves.
35. Explain the ethnobotanical significance of *Aegle marmelos*, *Cynadon dactylon* and *Trichopus zeylanicus*.
36. Explain Kani/TBGRI Model of benefit sharing.
37. Describe hot continuous extraction of drugs by Soxhlet methods.
38. Write short notes on botanical resources of gums and resins.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. **Each** question carries **15** marks. (Answer not to exceed **three** pages)

39. Explain how the quality, safety and efficacy of herbal medicines can be evaluated.
40. Discuss the role of ethnic groups in conservation of plant genetic resources.
41. Explain the significance of Traditional Knowledge in herbal drug development.
42. Discuss the medicinal properties of various plant parts with suitable examples.
43. Give occurrence, geographical distribution, cultivation, macroscopic characters and uses of coconut and paddy.
44. Discuss the utility of commonly available fruits and vegetables.

**(2 × 15 = 30 Marks)**

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Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**Core Course**

**BV 1541.2 : SYSTEMATICS, BIODIVERSITY AND ANIMAL BEHAVIOUR**

**(2018 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** the questions in a word or **one** or **two** sentences. Each question carries **1** mark.

1. Formal scientific naming of organisms.
2. Who wrote the book *Systema naturae*?
3. What is Linnaean Hierarchy?
4. Significance of the Red Data Book.
5. Reason for Co-Extinction.
6. *Ex situ* Conservation.
7. Chemical Communication.
8. Animal Society.

P.T.O.

9. Use of a Herbarium.
10. R.H. Whittaker.

**(10 × 1 = 10 Marks)**

SECTION – B

Answer any **eight** questions. Each question carries **2** marks. Answer not to exceed **1** paragraph.

11. State the Law of Priority.
12. Define Phenon.
13. Classical Conditioning.
14. Circadian Rhythm.
15. Testosterone and Reproduction.
16. Caste hierarchy in a Bee Hive.
17. Define Systematics
18. Role of Poaching in extinction.
19. Significance of Invasive species.
20. Give an example for Imprinting.
21. Expand C.I.T.E.S.
22. Ecosystem Stability.
23. Concept of Species.
24. Gamma Biodiversity.
25. Social signals in Animal Behaviour.
26. Role of Pineal gland.

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions. Each question carries **4** marks. Answer not to exceed **120** words.

27. Explain Chronobiology.
28. Significance of Latent Learning.
29. What are Fixed Action Patterns?
30. Explain different types of Biodiversity.
31. Describe Evolutionary Classification.
32. Role of Instincts in Survival.
33. Significance of Key stone species.
34. IUCN Categories.
35. List the Motivation Theories.
36. Types of Speciation.
37. Tree of Life.
38. Describe Agonistic Behaviour with an example.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. **Each** question carries **15** marks. Answer as a short essay.

39. Comment on International rules of Zoological nomenclature.
40. Describe the Biodiversity hotspots in the Indian region.

41. Explain the various Categories of Behaviour systems.
42. Write an essay on Hormones and Behaviour.
43. Explain Sociobiology, its properties and significance.
44. Elaborate on the various methods used in the study of Ethology.

**(2 × 15 = 30 Marks)**

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(Pages : 4)

**P – 2948**

**Reg. No. :** .....

**Name :** .....

**Fifth Semester B.Sc. Degree Examination, December 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**Core Course**

**BV 1542.2 : GENETICS**

**(2018 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions in a word or **one** or **two** sentences. Each question carries **1** mark.

1. Phenotype
2. Gene
3. Test Cross
4. Epistasis
5. Alkaptonuria
6. Sickle cell anaemia
7. Eugenics
8. Genome

**P.T.O.**

9. Exons
10. Dominant

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer any **eight** questions. Each question carries **2** marks. Answer not to exceed one paragraph.

11. What is codominance?
12. Quantitative inheritance
13. Explain crossing over.
14. Mitochondrial particles
15. What is intersex?
16. Split genes
17. Autosomes
18. Linkage
19. Induced mutations
20. Incomplete linkage
21. Co-epistasis
22. Gene mutations
23. Reciprocal cross
24. Monochromacy

25. Chiasmata

26. Genotype

**(8 × 2 = 16 Marks)**

SECTION – C

Answer any **six** questions. Each question carries **4** marks. Answer not to exceed **120** words.

27. Explain the role of multiple alleles.

28. Describe Germinal mutations.

29. Explain autosomal mutations.

30. Describe Genetic balance theory.

31. Explain Sex mosaics.

32. Describe Sex-influenced inheritance.

33. Explain Functional gene concept.

34. Give notes on Haemophilia.

35. Explain overlapping genes.

36. Describe Transgenics.

37. Give note on spontaneous mutations.

38. Explain Linkage groups.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. **Each** question carries **15** marks. Answer a long essay type.

39. Write an essay on the different types Syndromes.
40. Describe Sex linked anomalies.
41. Write an essay on Induction of mutations with reference to physical and chemical mutagens.
42. Explain multiple alleles with reference to ABO system and its inheritance.
43. Describe Linkage, crossing over and recombinations with suitable examples.
44. Write an essay on the environmental control of Sex determinations.

**(2 × 15 = 30 Marks)**

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(Pages : 4)

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Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2022**

**Career Related First Degree Programme under CBCSS**

**Biotechnology (Multimajor)**

**Core Course – VII**

**BV 1543 : ORGANIC CHEMISTRY – I**

**(2018 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions. Answer in **one** word to maximum **two** sentences.

Each question carries **1** mark.

1. What are free radicals?
2. Name two groups which show +M effect.
3. Justify the aromaticity of benzene on the basis of Huckel's rule.
4. Give an example for a meta directing group.
5. What is Jone's reagent?
6. What is power alcohol?
7. Mention any two uses of cinnamic acid.

P.T.O.

8. What is meant by chirality?
9. What is meant by racemization?
10. Name the product obtained when glucose reacts with HCN.

**(10 × 1 = 10 Marks)**

### SECTION – B

Short Answer type. Answer **any eight** questions. Each question carries **2** marks.

11. State Markownikoff's rule. Give an example to illustrate it.
12. What is meant by Hydroboration reaction?
13. What is meant by Friedal-Craft acylation reaction?
14. How does benzene undergo nitration and what is the product obtained?
15. How is chlorobenzene converted to phenol?
16. Give an example for crossed aldol condensation reaction.
17. How does citric acid react with acetyl chloride?
18. What are crown ethers? Give an example.
19. What is meant by resolution of a racemic mixture?
20. Distinguish between the terms conformation and configuration.
21. What is meant by mutarotation?
22. Write any two industrial applications of cellulose.
23. Chloro acetic acid is stronger than acetic acid while methyl acetic acid is weaker. How will you explain this?
24. What is Wolf-Kishner reduction? Give an example.
25. Explain what happens when benzaldehyde is heated with aluminium Isopropoxide in isopropyl alcohol.
26. Give equation for the reduction of 2-methyl cyclopentanone with NaBH<sub>4</sub>. Name the product.

**(8 × 2 = 16 Marks)**

## SECTION – C

Short Essay type. Answer **any six** questions. Each question carries **4** marks.

27. What happens when 2-bromobutane is heated with alcoholic KOH? Give the mechanism for the formation of the major product in the reaction.
28. Discuss any two the reason for the low reactivity of aryl halides towards nucleophilic substitution reaction.
29. Explain the Victor Meyer's test to distinguish between primary secondary and tertiary alcohols.
30. Discuss the ascent series in aliphatic carboxylic acids.
31. Explain the following with regard to their significance in the chemistry of aldehydes and ketones (a) Bromine water (b) Benedict's solution.
32. Distinguish between the terms enantiomers and diastereomers.
33. Write a note on the optical activity of allenes.
34. How is glucose converted to fructose? Explain with suitable equations.
35. Explain the salient structural difference between starch and cellulose.
36. Give the structure of the product when each of the following alcohols reacts with
  - (a)  $\text{KMnO}_4/\text{H}^+$  and
  - (b) PCC
    - (i) Pentan-1-ol
    - (ii) Pentan-2-ol.
37. Make a general comparison of the rates of nucleophilic addition for aldehydes and ketones and explain.
38. Explain the order of acidity of phenol, p-nitrophenol and p-methoxy phenol.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer **any two** questions. Each question carries **15** marks.

39. Discuss the two different mechanisms for nucleophilic aromatic substitution reactions.
40. Discuss the effect of substituents on acidity of aliphatic and aromatic carboxylic acids.
41. Explain the following :
- (a) Asymmetric synthesis
  - (b) Benzoin condensation reaction
  - (c) cis-hydroxylation.
42. (a) Explain the terms epimers and anomers.
- (b) Discuss the structure of sucrose.
43. Discuss and illustrate the significance of the various electron displacement effects in organic molecules.
44. Discuss the  $S_N1$ ,  $S_N2$  and  $S_{Ni}$  mechanisms of aliphatic nucleophilic substitution reaction.

**(2 × 15 = 30 Marks)**

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P – 2950

Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2022**

**Career Related First Degree Programme under CBCSS**

**Biotechnology (Multimajor)**

**BV 1544 : ENVIRONMENTAL BIOTECHNOLOGY**

**(2018 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in **a word** or **one** or **two** sentences. **Each** question carries **1** mark.

1. What is bioleaching?
2. Name any one energy crop.
3. Mention the importance of methanogenic bacteria.
4. Expand COD.
5. Identify the use of *Trichoderma*.
6. What is vermicomposting?
7. Define pollutant.
8. What is biostimulation?
9. Define sludge.
10. Comment on *Rhizobium*

**(10 × 1 = 10 Marks)**

P.T.O.

## SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks. (Answer not to exceed **one** paragraph)

11. What is biomass?
12. Discuss the advantages of gasohol experiment.
13. Explain hydrogen production by microbes.
14. Give a note on mycorrhiza.
15. What are the salient features of desert ecosystem?
16. Define biomineralisation.
17. What is Standard plate count?
18. Identify the importance of *E.coli* in water quality assessment.
19. What are biopesticides? Give examples.
20. What are causes of air pollution?
21. Identify the uses of *Azolla*.
22. Define biosphere.
23. What are bioherbicides?
24. Give note on biodiversity.
25. Explain BOD.
26. Comment on *Bacillus thuringiensis*.

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions. **Each** question carries **4** marks. (Answer not to exceed **120** words)

27. Discuss the methods of production of vegetable oil as engine fuels.
28. What are the environmental impact of non renewable energy sources?
29. Write a short essay on biological control of pests.
30. Briefly describe the mechanism of nitrogen fixation in biological systems.
31. Discuss on microbial quality assessment of water.
32. Write the effects of solid waste in environment.
33. What are hazardous waste? How to reduce its environmental effects?
34. Briefly discuss the sources of pollution.
35. Comment on water pollution.
36. What is bioremediation? Discuss briefly its types.
37. Write notes on biofertilizers.
38. "Cellulose is the source for future energy". Justify the comment.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. **Each** question carries **15** marks. (Answer not to exceed **three** pages)

39. Write an essay on bioassessment of environmental quality.
40. What are solid wastes? Discuss various methods of solid waste management.

41. Briefly discuss on types and treatment of industrial effluents.
42. Give an essay on renewable energy sources. Discuss its advantages and disadvantages.
43. Discuss the applications of environmental biotechnology in modern day problems.
44. What is an ecosystem? Briefly discuss various types of ecosystem.

**(2 × 15 = 30 Marks)**

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Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2022**

**Career Related First Degree Programme Under CBCSS**

**Biotechnology (Multimajor)**

**BV 1545 : PLANT BIOTECHNOLOGY AND ANIMAL BIOTECHNOLOGY**

**(2018 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in a word or **one** or **two** sentences. **Each** question carries **1** mark.

1. What are plant growth regulators?
2. Name any one commonly used plant tissue culture media.
3. Define an explant.
4. What you mean by micropropagation?
5. What are transgenic plants?
6. Define organ culture.
7. What is Hayflick limit?
8. What is Factor VIII?

P.T.O.

9. What is passaging in animal cell culture?
10. Define a stem cell.

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer **any eight** questions. **Each** question carries **2** marks. (Answer not to exceed **one** paragraph)

11. Name any two plant growth regulators.
12. Name any four components of plant tissue culture media.
13. What is an explant in tissue culture?
14. How filters help in sterilization?
15. What you mean by callus in tissue culture?
16. Why haploid plants are important?
17. Cite two examples for plant secondary metabolites.
18. What is the reason for somaclonal variation in plant tissue culture?
19. What is an immortalized cell line?
20. What are roller bottles?
21. Write a note on cryopreservation of animal cell cultures.
22. What is trypsinization?
23. What is meant by hybridoma technology?
24. Name the two major types of stem cells.
25. Define the term gene therapy.
26. How transgenic animals are useful in human life?

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer **any six** questions. **Each** question carries **4** marks. (Answer not to exceed **120** words)

27. Elaborate on the role of different classes of growth regulators in plant tissue culture.
28. Write a note on plant cell suspension culture.
29. Explain the different methods for micropropagation of plants.
30. Discuss the advantages and disadvantages of plant tissue culture methods.
31. What is protoplast culture? State its applications.
32. What are the different physical methods of gene transfer in plants? Explain briefly each of them.
33. Write a note on the applications of transgenic plants in agriculture.
34. Give an account of different components of the media used in animal cell culture.
35. What you mean by bioethics? Discuss the ethical issues in the production of transgenic animals.
36. Differentiate between anchor-dependent and suspension cultures.
37. Differentiate between roller bottle and spinner cultures.
38. What is stem cell culture? What are its clinical uses?

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer **any two** questions. **Each** question carries **15** marks. (Answer not to exceed three pages)

39. Explain the composition of the plant tissue culture media. Elaborate on the functions of each component.
40. Write an essay on the different sterilization techniques used in plant tissue culture.
41. Elaborate on the *Agrobacterium* mediated genetic transformation of plants. Explain its advantages and applications.
42. Elaborate on the applications of animal cell cultures with reference to products important in medicine and health.
43. Write an essay on the large-scale cultivation of animal cells.
44. Discuss in detail the composition of animal cell culture media and the various physical parameters to maintain the culture.

**(2 × 15 = 30 Marks)**

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Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2 (b) Biotechnology (Multimajor)**

**Core Course**

**BV 1541.1 : ANGIOSPERM MORPHOLOGY AND SYSTEMATIC BOTANY**

**(2019 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

PART – A

Answer **all** questions in **one** word to maximum of **2** sentences.

1. Name a plant that shows monadelphous condition.
2. How many families are there in Bentham and Hooker system of classification?
3. Expand OTU.
4. What are polygamodioecious plants?
5. Which family possess cyathium?
6. Name the family having pollinia.
7. Write the family where monothealous anthers are seen.
8. Point out the inflorescence where cymes arranged in racemose fashion.

P.T.O.

9. What is the standard size of a herbarium sheet?
10. The acronym MH stands for which herbarium?

**(10 × 1 = 10 Marks)**

**PART – B**

Answer any **eight** questions in not more than one paragraph.

11. What is marginal placentation?
12. Comment on gynostegium.
13. What is effective publication?
14. Draw the floral diagram of any of the members of Rubiaceae.
15. Write the systematic position of Liliaceae as per Bentham and Hooker system.
16. Arecanut is berry where as Coconut is drupe. Justify the statement with reasons.
17. Comment on the perianth in Poaceae.
18. What is a good character in taxonomy?
19. Write a note on heterogamous head.
20. Compare a raceme and a spike.
21. What are exalbuminous seeds?
22. Cashew apple is not a true fruit. Justify the statement with reason.
23. How does axile placentation differs from free central placentation?
24. Name two chemicals used to protect Herbarium specimens from insects.

25. Write two wellknown herbaria from India and give their acronym.
26. Compare the ovary in Euphorbiaceae and Rubiaceae.

**(8 × 2 = 16 Marks)**

PART – C

Answer any **six** questions in not more than **120** words.

27. What are the functions of Botanical gardens?
28. Write the diagnostic features of Apocynaceae.
29. Explain neoadansonian principles.
30. Write a note on floral peculiarities of orchids.
31. Explain the sexual system of classification by Linnaeus.
32. Diagrammatically explain verticillaster inflorescence.
33. Comment on aggregate and multiple fruit.
34. Differentiate between valid and effective publication
35. Write an account on the floral characters of Mimosaceae.
36. Write a note on mounting and labelling of specimen for Herbarium.
37. Diagrammatically represent aestivation types.
38. Explain the floral characters of Amaranthaceae.

**(6 × 4 = 24 Marks)**

## PART – D

Answer any **two** questions.

39. Write a detailed account on the racemose and cymose inflorescence with diagrams.
40. Discuss on cytotaxonomy and chemotaxonomy as tools in systematics.
41. Explain the principles of ICBN and point out the nomenclatural types.
42. Explain Bentham and Hooker system of classification. Discuss its merits and demerits.
43. Outline Engler and Prantle system of classification. Briefly explain how it is superior over Bentham and Hooker classification.
44. Explain the steps involved in the preparation of herbarium and discuss its role in taxonomic research.

**(2 × 15 = 30 Marks)**

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P – 2956

Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2022**

**Career Related First Degree Programme Under CBCSS**

**Group 2(b) Biotechnology (Multimajor)**

**Core Course**

**BV 1542.1 : ECONOMIC BOTANY, ETHNOBOTANY AND  
MEDICINAL BOTANY**

**(2019 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in a word or **one** or **two** sentences. **Each** question carries **1** mark.

1. What is the botanical name of ragi?
2. Mention the use of cotton.
3. Name the family of Henna.
4. Mention the medicinal use of *Ocimum sanctum*.
5. What is the morphology of economically important part in Bottle gourd?
6. Expand BSI.
7. Name the active principle in *Coffee*.

P.T.O.

8. Write the binomial of Bengal gram.
9. What is the morphology of Pineapple?
10. Write down the family of Sesame.

(10 × 1 = 10 Marks)

#### SECTION – B

Answer **eight** questions. **Each** question carries **2** marks.

11. Name the morphology of the source of two oil yielding plants.
12. Write on the morphology of tomato and jackfruit.
13. What are the uses of cashew apple?
14. List the importance of *Aegle marmelos*.
15. What is the role of NBGRI?
16. Name the largest sacred grove of Kerala and its location.
17. Discuss the medicinal importance of *Cynodon dactylon*.
18. What is the principle behind Unani medicines?
19. Comment on the medicinal importance of *Curcuma*.
20. What is mother tincture in Homeopathy?
21. What is kashayam in Ayurveda?
22. Write on the medicinal importance of *Andrographis paniculata*.
23. Comment on the medicinal importance of *Brahmi*.

24. Define crude drug? Write one example.
25. What is plant extraction method?
26. Write the botanical name and family of apple.

**(8 × 2 = 16 Marks)**

### SECTION – C

Answer **any six** questions. **Each** question carries **4** marks. (Answer not to exceed **120** words)

27. Comment on the scope of ethnobotany.
28. Write on the binomial, family and uses of sugarcane.
29. What is the importance of Pepper and Cardamom?
30. Enumerate the reasons for conserving individual species.
31. What are the services provided by Botanical survey of India?
32. Discuss the role of National agencies in conservation of plants.
33. State the principle of Homeopathic medicine.
34. What are the benefits of getting Acupuncture?
35. Write the botanical name of any four Cucurbits.
36. Discuss Neem as an insecticide yielding plant.
37. Write a short account on Arogyapacha used by tribes.
38. Brief a note on economic importance of Tapioca.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer **any two** questions. **Each** question carries **15** marks. (Answer not to exceed three pages)

39. Give an account on ethnobotanical data and its collection methods.
40. What are sacred groves? Discuss its role in protection and conservation of plant species.
41. Give a comparative account on ancient and modern medicines.
42. Write on the medicinal value of *Aswagandha*, *Andrographis*, *Phyllanthus* and *Asparagus*.
43. Write the binomial, family, morphology of the useful part and uses of any two cereals, millets and pulses.
44. Write a detailed essay on paddy cultivation.

**(2 × 15 = 30 Marks)**

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**Reg. No. :** .....

**Name :** .....

**Fifth Semester B.Sc. Degree Examination, December 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2 (b) : Biotechnology (Multimajor)**

**Core Course**

**BV 1544 : ENVIRONMENTAL BIOTECHNOLOGY**

**(2019 Admission onwards)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** the questions in a word or **one** or **two** sentences. Each question carries **1** mark.

1. What is Coliform in water sample?
2. Define endemism.
3. What is bioaccumulation?
4. Name a nitrogen fixing bacteria.
5. What is biodiesel?
6. Define a fuel.
7. What are aerosols?

**P.T.O.**

8. Mention the significance of mycorrhiza.
9. What are methanogens?
10. Name two gaseous pollutants.

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer **any eight** questions. Each question carries **2** marks. (Answer not to exceed **one** paragraph)

11. What are biopesticides?
12. Define ecological diversity.
13. What is a smog?
14. Explain Chemical Oxygen Demand.
15. What is biomineralisation?
16. Give an account on energy crops citing an example.
17. What is radioactive fallout?
18. List any four major water pollutants.
19. What are the features of a grassland ecosystem?
20. Differentiate between primary and secondary pollutants.
21. What are biosensors?
22. Why is it necessary to monitor the microbiologic quality of a food sample?
23. How is gasohol produced?

24. Brief a note on bioherbicides.
25. What are non renewable energy resources?
26. How do microorganisms affect food quality?

**(8 × 2 = 16 Marks)**

### SECTION – C

Answer **any six** questions. Each question carries **4** marks. (Answer not to exceed **120** words)

27. What is biodiversity? What is its importance?
28. List any two applications of *Bacillus thuringiensis*.
29. Explain the process of biogas production.
30. Brief a note on domestic waste? Give examples.
31. Discuss on vegetable oils used as engine fuels.
32. Explain the types of ecosystem.
33. Discuss bioassessment measures to sustain environmental quality.
34. Explain microbial degradation of pesticides.
35. Why BOD is important in water quality?
36. Comment on petrochemicals.
37. Explain biological control of pests and insects.
38. Brief a note on air quality standards.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer **any two** questions. Each question carries **15** marks. (Answer not to exceed **3** pages)

39. What is environmental biotechnology? Discuss its scope and importance.
40. Discuss the impact of conventional source of energy on environment.
41. Give an account on solid waste. Discuss the effects of solid waste in the environment.
42. Discuss the applications of biotechnology for crop improvement.
43. What are the causes and effects of water pollution?
44. Discuss the application of microbes in fuel production from biomass.

**(2 × 15 = 30 Marks)**

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Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2 (b) : Biotechnology (Multimajor)**

**BV 1545 : PLANT BIOTECHNOLOGY AND ANIMAL BIOTECHNOLOGY**

**(2019 Admission onwards)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** the questions in a word or **one** or **two** sentences. Each question carries **1** mark.

1. Define De-differentiation.
2. What is the role of Thiamine in a tissue culture medium?
3. Comment on Lipofection.
4. What is filter sterilization?
5. What are 'Marker genes'? Give one example.
6. Define Secondary cell culture.
7. What are the commonly used medium for plant cell culture?
8. What is a cryoprotectant?
9. What are Roller bottles?
10. Mention any two uses of hairy root technique.

**(10 × 1 = 10 Marks)**

P.T.O.

## SECTION – B

Answer **any eight** questions. Each question carries **2** marks. (Answer not to exceed **one** paragraph).

11. What is *t*-plasminogen activator? What is its role?
12. Write a brief note on Crown gall disease.
13. Define Pluripotency.
14. Mention briefly the merits of Somaclonal variation.
15. What are polyclonal antibodies?
16. Enlist the types of stem cells.
17. Comment on Transgene.
18. What is electroporation?
19. How animal cell cultures are preserved?
20. What are the critical physical parameters for in vitro culture?
21. What are bioreactors?
22. What is the role of auxins in plant cell culture?
23. Mention the significance of pollen culture.
24. Comment on meristem culture.
25. What are the applications of animal cell culture?
26. Give a short note on different types of animal cell lines and its uses.

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer **any six** questions. Each question carries **4** marks. (Answer not to exceed **120** words)

27. Comment on bioethical concerns of animal cell culture.
28. How cell suspension culture is produced?
29. Write a brief note on another culture and its significance.
30. Explain briefly the steps in plant transformation using *Agro bacterium*.
31. Briefly explain how clonal multiplication is achieved by shoot tip culture.
32. What are the reasons for somaclonal variations?
33. Briefly explain the main steps in protoplast culture and its uses.
34. What are the growth factors used in animal cell culture?
35. Discuss the Impact of transgenic plants in agriculture.
36. What are the chemical methods of gene transfer? Explain.
37. Comment on biolistics and its uses.
38. What is Ti Plasmid? Describe its role in transgenesis.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer **any two** questions. Each question carries **15** marks. (Answer not to exceed **3** pages)

39. Write an essay on animal cell culture and its applications.
40. What is meant by micro propagation? Explain its main steps and advantages.

41. Give an account on genetic engineering in plants. Mention the major achievements.
42. Write an essay on the procedure of production of recombinant proteins in animal cells.
43. Describe the various sterilization methods used in *in vitro* technique. Write about the lab protocols for maintaining aseptic condition.
44. Write an essay on Tissue grafting and its uses.

**(2 × 15 = 30 Marks)**

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Reg. No. : .....

Name : .....

**Sixth Semester B.Sc. Degree Examination, April 2022**  
**Career Related First Degree Programme under CBCSS**  
**Group 2(b) — Biotechnology (Multimajor)**  
**BV 1641.1 — GENETICS**  
**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

I. Answer the following. **All** questions are compulsory.

1. What are holandric genes?
2. What are quantitative traits?
3. Define alleles.
4. What is test cross?
5. Define cistron.
6. What are split genes?
7. Why is DNA more stable than RNA?
8. Who discovered the transforming agent?
9. Name any translational inhibitor.
10. What is the unit of genetic map?

**(10 × 1 = 10 Marks)**

P.T.O.

II. Answer any **eight** of the following.

11. Write note on wobble hypothesis.
12. What is helicase enzyme adding a note on its usage in DNA replication.
13. Comment on house keeping genes with suitable examples.
14. What is Shine-Dalgarno sequence? Where it is found? Mention its function.
15. Differentiate sex-linked and sex-limited inheritance.
16. What is the function of DNA glycosylase enzyme involved in base excision repair?
17. What is a promoter? Explain its components.
18. Differentiate satellite and repetitive DNA.
19. Explain interference and coincidence.
20. Differentiate backcross and testcross.
21. What are the functions of histones?
22. Differentiate nucleotide from nucleoside.
23. Comment on Y-linked inheritance
24. Briefly explain sex determination in higher plants.
25. Compare polycistronic and monocistronic mRNA.
26. Comment on overlapping genes.

**(8 × 2 = 16 Marks)**

III. Answer any **six** of the following.

27. Briefly describe various mechanisms of DNA repair.
28. Explain different forms of DNA you have studied.
29. Name indicating their functions, a few additional enzymes, other than DNA polymerase and ligase, that are involved in the replication of DNA with high degree of processivity and accuracy.

30. Describe three-point test cross.
31. What are multiple alleles? Describe with suitable examples.
32. Describe the structure and function of tRNA with the help of suitable diagram.
33. Define and discuss the concept of Hardy-Weinberg Law.
34. Give an overview on various sex chromosomal abnormalities in human.
35. Briefly explain the different types of RNA you have studied with special emphasis to its structure and function.
36. Explain various factors affecting population equilibrium.
37. Explain the properties of genetic code.
38. Differentiate with suitable examples incomplete dominance and epistasis.  
**(6 × 4 = 24 Marks)**

IV. Write **essay** on any **two** of the following.

39. Describe prokaryotic semi conservative DNA replication with suitable diagram.
40. Write an essay on Mendel's Laws of inheritance with suitable examples.
41. Explain in detail extra nuclear inheritance with suitable examples.
42. Explain various types of gene interactions you have studied with suitable examples.
43. Give a general account of transposable elements, its characteristics, types and significance.
44. Outline the molecular events lead to the synthesis of mRNA by RNA polymerase II. Explain the post transcriptional events takes place in a eukaryotic cell.

**(2 × 15 = 30 Marks)**

(Pages : 4)

**N – 1671**

**Reg. No. :** .....

**Name :** .....

**Sixth Semester B.Sc. Degree Examination, April 2022**  
**Career Related First Degree Programme under CBCSS**  
**Group 2(b) Biotechnology (Mutlimajor)**  
**Core Course**  
**BV 1641.2 : EVOLUTION**  
**(For Zoology, Chemistry and Biotechnology)**  
**(2018 & 2019 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

I. Answer the following questions (In one or two sentences. **One** mark each)

1. Hot dilute soup
2. Directional selection
3. Microspheres
4. Adaptive radiation
5. Prokaryotes
6. Macroevolution
7. Orthogenesis
8. Convergent evolution
9. Eukaryotes
10. Cladogenesis

**(10 × 1 = 10 Marks)**

P.T.O.



## SECTION – B

II. Answer any **eight** of the following (Not to exceed **one** paragraph. Each question carries **2** marks)

11. Explain Altruism
12. Biogenesis
13. Explain kin selection
14. Name the types of fossils
15. Describe stabilizing selection
16. Explain Quantum evolution
17. Reproductive isolation
18. Allopatric speciation
19. Wallacea
20. Insular fauna
21. Explain megaevolution
22. Neutral selection
23. Devonian period
24. Proteinoids
25. Connecting link
26. Biogenetic law

**(8 × 2 = 16 Marks)**

## SECTION – C

III. Answer any **six** of the following (Not to exceed **120** words. Each carries **4** marks)

27. Describe the experiment of Urey-Miller.
28. Explain the evidences of Organic evolution.
29. Write a note on evolutionary clocks.
30. Explain the theory of panspermia.
31. Explain the Batesian and Mullerian mimicry and their significance.
32. Explain the Mutation theory.
33. Describe the criticism on Darwinism.
34. Write a note on dating of fossils.
35. Explain gradualism.
36. Explain Founder effect.
37. Describe Disruptive selections.
38. Explain genetic load.

**(6 × 4 = 24 Marks)**

## SECTION – D

IV. Answer any **two** of the following (Each carries **15** marks)

39. Write an essay on the postulations of Charles Darwin.
40. Describe the types and significance of Isolating mechanisms.
41. Write an essay on the process of Origin of life.

42. Describe the evidences for evolution.
43. Write an essay on Molecular evolution.
44. Write an essay on gene frequency and the factors affecting it.

**(2 × 15 = 30 Marks)**

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(Pages : 3)

**N – 1672**

Reg. No. : .....

Name : .....

**Sixth Semester B.Sc. Degree Examination, April 2022.**

**Career Related First Degree Programme under CBCSS**

**Group 2 (b) Biotechnology Multimajor**

**BV 1643 – ORGANIC CHEMISTRY – II**

**(2014 & 2017 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. Answer in one word to maximum two sentences. Each question carries **1** marks.

1. What are the monomers of Buna-S?
2. Define saponification value.
3. Draw the structure of sulphadiazine.
4. What are the purine bases present in DNA?
5. Which disease is caused by the deficiency of vitamin A?
6. Predict the carbonyl stretching frequency of acetone.
7. Give any one applications of quinine.
8. What is a chromophore?
9. Give a colour reaction for the identification of proteins.
10. What are the uses of urea-formaldehyde resins?

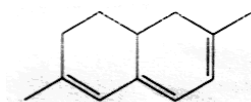
**(10 × 1 = 10 Marks)**

P.T.O.

## SECTION – B

Short answer type. Answer **any eight** questions from the following. Each question carries **2** marks.

11. What are Sulpha drugs?
12. Calculate  $\lambda_{\max}$  for the following compound.



13. What is Nylon-6,6?
14. What is base peak in a mass spectrum?
15. What is meant by blue shift?
16. What are hormones? Give an example.
17. What are the different classes of amino acids?
18. What are the physiological functions of vitamin C?
19. Give a general method for the preparation of  $\alpha$ -amino acids.
20. What is genetic code?
21. Give a general method for the preparation of acetoacetic ester.
22. Explain the significance of fingerprint region in IR spectrum.

**(8 × 2 = 16 Marks)**

## SECTION – C

Short essay type. Answer **any six** questions from the following. Each question carries **4** marks

23. Explain number average molecular mass of a polymer.
24. Give an account on the effect of substituents on the basicity of amines.
25. What is neoprene? How is it synthesized? What are its important applications?

26. Explain the salient features of TMS.
27. Explain the classification of dyes.
28. Explain McLafferty rearrangement?
29. Explain the synthetic utility of diazo compounds.
30. Explain the preparation and applications of benzene sulphonic acid.
31. Discuss  $^1\text{H}$  NMR spectrum of ethyl bromide

**(6 × 4 = 24 Marks)**

#### SECTION – D

Answer **any two** questions, Each question carries **15** marks.

32. Give an account on
  - (a) Molecular vibrations and factors influencing vibrational frequencies
  - (b) Spin-spin splitting
33. Write a note on
  - (a) Structure of proteins
  - (b) Classification of vitamins
34. Explain
  - (a) Theory of colour and constitution
  - (b) Classification of enzymes
35. Explain the mechanism of
  - (a) Beckmann rearrangement
  - (b) Wittig reaction
  - (c) Reformatsky reaction

**(2 × 15 = 30 Marks)**

(Pages : 4)

**N – 1673**

Reg. No. : .....

Name : .....

**Sixth Semester B.Sc. Degree Examination, April 2022**

**Career Related First Degree Programme under CBCSS**

**Group 2(b): Biotechnology (Multimajor)**

**Core Course**

**BV 1643 : ORGANIC CHEMISTRY – II**

**(2018 & 2019 Admission)**

**Time : 3 Hours**

**Max. Marks : 80**

SECTION – A

Answer **all** questions. Answer in **one** word to maximum **two** sentences.  
**Each** question carries **1** mark.

1. What is the monomer of PVC?
2. Draw the structure of geranial.
3. Define saponification value of an oil.
4. Name the heterocyclic bases present in RNA.
5. Which disease is caused by the deficiency of vitamin C?
6. Predict the total number of peaks in the PMR spectrum of benzene.
7. Give an example for a sulpha drug.
8. What are essential oils?

P.T.O.

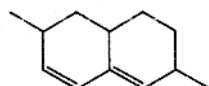
9. Give a method for the separation of mixture of amines.
10. Give an example for a non-essential amino acid.

(10 × 1 = 10 Marks)

### SECTION – B

Short answer type... Answer any **eight** questions from the following. **Each** question carries **2** marks.

11. Explain the tautomerism exhibited by nitro compounds.
12. Calculate  $\lambda_{\max}$  for the following compound.



13. What is Buna-N?
14. Explain the preparation of Nylon-6,6.
15. What are the different types of polymerizations?
16. What is Sandmeyer reaction?
17. What are auxochromes?
18. What are essential amino acids? Give an example.
19. Define the term number average molecular mass of a polymer.
20. What is benzidine rearrangement?
21. What is meant by base peak in a mass spectrum?
22. What are the different classes of enzymes?
23. What are the physiological functions of vitamin A?



24. State and explain special isoprene rule.
25. What are hormones? Give an example for a hormone produced by adrenal gland.
26. What is meant by hyperchromic shift?

**(8 × 2 = 16 Marks)**

### SECTION – C

Short essay type. Answer any **six** questions from the following. **Each** question carries **4** marks.

27. What are sulpha drugs? Explain.
28. Explain detergent action.
29. Explain the salient features of enzymes.
30. What is Grignard reagent? How it is prepared? Explain the reactions of Grignard reagent.
31. Explain the synthesis of (a) fluorescein and (b) methyl orange.
32. Explain how to distinguish primary, secondary and tertiary amines.
33. Discuss about the classification of amino acids.
34. Explain the preparation and uses of Urea-formaldehyde resin.
35. Explain the replication of DNA.
36. What is PMMA? How it is synthesized? What are its important applications?
37. Discuss about Zeigler Natta polymerization.
38. Explain the classification of dyes.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. **Each** question carries **15** marks.

39. Explain
- (a) The theory of colour and constitution
  - (b) Preparation of congo red.
40. Write an essay on the preparation, structure and synthetic importance of diazonium compounds.
41. Give an account on
- (a) Theory of mass spectrometry
  - (b) Explain Mclafferty rearrangement.
42. Write an essay on the structure of proteins.
43. Discuss about
- (a) Mechanism of Reformatsky reaction.
  - (b) Preparation and synthetic applications of acetoacetic ester.
44. Explain the mechanism of
- (a) Knoevenangal reaction.
  - (b) Wittig reaction.
  - (c) Reimer-Tiemann reaction.

**(2 × 15 = 30 Marks)**

(Pages : 3)

**N – 1675**

**Reg. No. :** .....

**Name :** .....

**Sixth Semester B.Sc. Degree Examination, April 2022**  
**Career Related First Degree Programme under CBCSS**  
**Group 2(b) Biotechnology (Multimajor)**  
**BV 1661.2: MUSHROOM CULTIVATION AND MARKETING**  
**(2017 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in a **word** or **one** or **two** sentences. **Each** question carries **1** mark.

1. What is mycotoxicosis?
2. Name two substrates used for mushroom cultivation.
3. Define pileus.
4. What is a hymenium?
5. Give the binomial of paddy straw mushroom.
6. What are pinheads?
7. Define a basidiospore.
8. Which mushroom is known as 'Death cap'?
9. Name a centre involved in mushroom research.
10. What are toadstools?

**(10 × 1 = 10 Marks)**

P.T.O.

## SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks. (Answer not to exceed **one** paragraph)

11. What is casing in mushroom cultivation?
12. Explain the morphology of *Pleurotus*.
13. Why mushrooms are called “vegetable meat”?
14. List four edible mushrooms in India.
15. What is canning?
16. Brief a note on milky white mushroom.
17. Write any four medicinal uses of mushroom.
18. What is polythene bag method?
19. Briefly explain mushroom processing by freeze drying.
20. Draw the diagram of a dikaryotic mycelium.
21. Write a note on compost preparation for mushroom cultivation.
22. Give binomial of two *Agaricus* species.

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions. **Each** question carries **4** marks. (Answer not to exceed **120** words)

23. What are the harmful effects of mushroom poisoning?
24. Distinguish blanching and steeping.
25. Give a brief account on any two poisonous mushrooms.

26. What is a spawn? Add a note on its preparation.
27. Brief a note on harvesting of mushrooms.
28. Discuss the nutritional value of mushrooms.
29. Explain the pretreatment of substrate for button mushroom cultivation
30. Comment on storage methods of mushrooms on a commercial scale.
31. Write the recipe for preparing mushroom pickle.

**(6 × 4 = 24 Marks)**

SECTION – D

Answer any **two** questions. **Each** question carries **15** marks. (Answer not to exceed **three** pages)

32. Describe the life cycle of *Agaricus*.
33. Give an account on common pests, disease prevention and control measures in mushrooms.
34. Describe the cultivation method of Oyster mushroom.
35. Explain the international trade and marketing status of mushroom.

**(2 × 15 = 30 Marks)**

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(Pages : 3)

N – 1678

Reg. No. : .....

Name : .....

**Sixth Semester B.Sc. Degree Examination, April 2022**  
**Career Related First Degree Programme under CBCSS**  
**Group 2(b) Biotechnology (Multimajor)**  
**BV 1661.5 : FOOD AND DAIRY BIOTECHNOLOGY**  
**(2017 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** the questions in a word or **one** or **two** sentences. **Each** question carries **1** mark.

1. Identify the importance of *Bacillus cereus*.
2. What is Minchin?
3. Expand ELISA.
4. What is san Francisco dough bread?
5. What is HTST pasteurization?
6. Give note on Enterotoxin.
7. Define Halophiles.
8. What is monosodium glutamate?
9. Identify the uses of *sacchromyces cerevisiae*.
10. What is kefir?

**(10 × 1 = 10 Marks)**

P.T.O.

## SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks. Answer not to exceed **1** paragraph

11. What is TDT?
12. Give a note on the uses of ethylene in food processing.
13. Identify the uses of *Lactobacillus delbrueckii subsp. bulgaricus*.
14. What is soy sauce?
15. What is botulism?
16. Mention the uses of *Aspergillus niger*.
17. Give note on Radioimmunoassay.
18. What is  $a_w$  value?
19. What do you mean by Rickettsiae?
20. Explain the classification of foods by ease of spoilage.
21. Write a note on Miso.
22. Explain the standard plate count.

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions. (Answer not to exceed **120** words) **Each** question carries **4** marks.

23. Explain the symptoms and causative organisms of any four bacterial food-borne illness.
24. Briefly explain the methods and techniques to detect microorganisms in food.

25. Explain the factors affecting the growth of microorganisms in food.
26. Give an account on spoilage of cheese.
27. Explain on chemical spoilage of foods.
28. Explain the sources of contamination of foods.
29. State the uses of microbiological indicator organisms in food preservation.
30. Write a note on different types edible mushrooms.
31. Explain the industrial production of acetic acid using microorganisms.

**(6 × 4 = 24 Marks)**

SECTION – D

Answer any **two** questions. (**not** more than **three** pages) **Each** question carries **15** marks.

32. Give a detailed note on industrial production of antibiotics.
33. Write an essay on methods of food preservation.
34. Give a detailed note on food borne diseases and their prevention.
35. Explain the various uses of microbes in food production with suitable examples.

**(2 × 15 = 30 Marks)**

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(Pages : 4)

N – 1680

Reg. No. : .....

Name : .....

**Sixth Semester B.Sc. Degree Examination, April 2022**  
**Career Related First Degree Programme Under CBCSS**  
**Biotechnology (Multi-Major)**  
**Elective Course**  
**BV 1661.1 – HORTICULTURE**  
**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. **Each** question carries **1** mark.

1. Write down the use of sphagnum moss in the preparation of potting media.
2. What is vermiculite?
3. What are biofertilizers?
4. What is Ikebana?
5. Write down garland making.
6. Mention any two major preservation techniques of fruits.
7. Write down any two examples of garden tools.
8. Write down the combination of NPK.

P.T.O.

9. Write down any two examples of growth regulators.
10. What are growth promoters?

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks.

11. What are the major applications of horticulture?
12. Write a note on the preparation of potting media.
13. Comment on methods of vegetative propagation adopted in horticulture.
14. Define the preparation of compost.
15. What is bridge grafting?
16. Mention the major components of garden making.
17. Define ornamental hedge in a garden.
18. Write a note on trophy.
19. Define indoor garden.
20. Comment on bonsai making.
21. What you mean by carpet beds in a garden?
22. Write down free style arrangement of flowers.
23. Define parthenocarpy.
24. What are weedicides?
25. Write any two common diseases in vegetable crops.
26. Comment on the role of parthenocarpy in horticulture.

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions. **Each** question carries **4** marks.

27. What are the major objectives of horticulture?
28. Explain the specific role of each components of NPK.
29. Differentiate between biofertilizers and chemical fertilizers.
30. Point out the major advantages and disadvantages of hydroponics.
31. What is ground layering? Write down the method of trench and compound layering.
32. Comment on various garden implements used in horticulture.
33. Write down the time and application of fertilizers in horticulture practices.
34. Briefly explain the various types of flower arrangements.
35. Write down the methods of harvesting flowers.
36. Describe the flower induction and its merits in horticulture.
37. Write a note in the role of plant growth regulators.
38. Differentiate between fungicides and pesticides. Point out the disadvantages in their uses.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. **Each** question carries **15** marks.

39. Point out the various types of pots and containers used in garden making.
40. Write an essay on budding and point out the merits and demerits.

41. Describe the types of topiary and rockery in a garden.
42. Discuss the various methods of irrigation and its merits.
43. Describe the structure and role of green house in an indoor garden.
44. Write down the preservation and processing of fruits and vegetables.

**(2 × 15 = 30 Marks)**

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(Pages : 4)

**N – 1681**

**Reg. No. :** .....

**Name :** .....

**Sixth Semester B.Sc. Degree Examination, April 2022**  
**Career Related First Degree Programme under CBCSS**  
**Group 2(b) Biotechnology (Multimajor)**  
**BV 1661.2 : MUSHROOM CULTIVATION AND MARKETING**  
**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in a word or **one** or **two** sentences. Each question carries **1** mark.

1. What are mushrooms?
2. Mention any two commercially growing mushrooms in Kerala.
3. Define blanching.
4. Name the conventional substrate used for oyster mushroom cultivation.
5. What are substrates in mushroom cultivation?
6. Which Indian state is the largest producer of mushrooms?
7. List out the top two vitamins present in edible mushrooms.
8. Define spawn run period.

P.T.O.

9. Name any two medicinally important mushrooms.
10. Name the mushrooms found associated with termite mounts.

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks. (Answer not to exceed one paragraph)

11. Name any two cereals used for mushroom spawn preparation.
12. What is composting in mushroom cultivation? Name the mushroom varieties grown on compost medium.
13. What are the different types of spawning practiced in mushroom cultivation?
14. List any two post harvest practices followed for mushrooms to retain its colour and shape.
15. In what way milky mushroom cultivation differ from oyster mushroom cultivation?
16. Name any two substrates used for *Pleurotus* mushroom cultivation.
17. How casing mixture is prepared for button mushroom cultivation?
18. How to calculate biological efficiency of mushrooms?
19. Write the names of any four recipes prepared with mushrooms.
20. Comment on chemical preservatives used for mushrooms.
21. Name any two species of button mushrooms grown in India.
22. What are additives in mushroom cultivation? Name any one additive used.
23. Mention the quality criteria required for ideal spawn for mushroom cultivation.
24. What is meant by chemical sterilization of substrates?
25. Mention the probable uses of mushroom spent substrates.
26. What is casing? Mention various stages of it

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions. **Each** question carries **4** marks. (Answer should not exceed **120** words)

27. Write short note on mushroom harvesting and packing.
28. Comment on pretreatment of substrates.
29. Briefly explain the process of mushroom spawn production.
30. Describe about bacterial and viral diseases of mushrooms.
31. Why mushrooms are called 'nutraceutical food' item?
32. Write a short note on the cultivation of paddy straw mushroom.
33. Discuss the various mushroom growing factors influencing mushroom production.
34. Briefly explain the stages of button mushroom cultivation.
35. Comment on the role of financial institutions for mushroom cultivation and trade.
36. Value addition is the key element in mushroom trade. Justify.
37. Mention any four advantages of milky mushrooms over oyster mushrooms.
38. Comment on any two mushroom processing techniques.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. **Each** question carries **15** marks. (Answer not to exceed **three** pages)

39. Explain the various stages of button mushroom cultivation. In what way button mushroom cultivation differ from oyster mushroom cultivation?
40. Write an essay on post harvest processing, storage and value addition in mushrooms.
41. Describe the scope and significance of common Indian mushrooms. Add a note on the significance of mushroom cultivation in Kerala.

42. Discuss in detail on the infrastructural requirements for starting a mushroom cultivation Unit.
43. Describe the cultivation of oyster mushrooms (*Pleurotus* species) using paddy straw as growing medium.
44. Write an essay on various pest and diseases of mushroom cultivation and their management strategies.

**(2 × 15 = 30 Marks)**

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(Pages : 3)

**N – 1683**

**Reg. No. :** .....

**Name :** .....

**Sixth Semester B.Sc. Degree Examination, April 2022**  
**Career Related First Degree Programme under CBCSS**  
**Biotechnology (Multi – Major)**  
**BV 1661.4 : BIOINFORMATICS AND NANOBIO TECHNOLOGY**  
**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. **Each** carries **one** mark.

1. Mention the two major objectives of bioinformatics.
2. Expand NCBI.
3. Comment on CLUSTAL W.
4. What you mean by sequence alignment?
5. What is database?
6. What is proteomics?
7. What is genomics?
8. Expand PAGE.
9. Define quantum dots.
10. What is DNA-Sensor?

**(10 × 1 = 10 Marks)**

P.T.O.

## SECTION – B

Answer any **eight** questions. **Each** carries **two** marks.

11. Write down the scope of bioinformatics.
12. Briefly describe the importance of databases in biotechnology.
13. Write a note on impact of bioinformatics in modern biology.
14. Comment on pair wise sequence alignment.
15. Cite two examples of database similarity searching tool.
16. Define protein expression analysis.
17. Define protein data bank.
18. What is mass-spectrometry?
19. What you mean by microarray?
20. Mention the major objectives of nano-biotechnology.
21. What are nano crystals?
22. What is DNA chip?
23. What you mean by drug delivery?
24. Write a note on prosthesis.
25. Comment on implants.
26. Mention the application of DNA sensors.

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions. **Each** carries **four** marks.

27. Write a note on history and evolution of bioinformatics.
28. Describe the role of gen bank in bioinformatics.

29. Describe the use of PubMed in biology.
30. How do you use BLAST in similarity searches?
31. Define PHYLIP and list out the major applications.
32. What are the major applications of proteomics?
33. Comment on the major applications of genomics?
34. What are the major applications of nano crystals?
35. Write down the merits of bioinformatics.
36. Critically evaluate the demerits of bioinformatics.
37. Which are the merits of nanobiotechnology?
38. Mention the demerits of nanobiotechnology.

**(6 × 4 = 24 Marks)**

#### SECTION – D

Answer any **two** questions. **Each** question carries **fifteen** marks.

39. Describe the biological databases and its importance in biotechnology.
40. Discuss about the pair wise sequence alignment.
41. Explain the various steps of phylogenetic tree construction.
42. Write down the classification of nano materials.
43. Describe the drug delivery systems and various techniques.
44. Write an essay on the applications of nanobiotechnology in medicine and health.

**(2 × 15 = 30 Marks)**

(Pages : 3)

**N – 1684**

**Reg. No. :** .....

**Name :** .....

**Sixth Semester B.Sc. Degree Examination, April 2022**  
**Career Related First Degree Programme Under CBCSS**  
**Group 2 (b) : Biotechnology (Multimajor)**  
**BV 1661.5 : FOOD AND DAIRY BIOTECHNOLOGY**  
**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions, Each carries **1** mark.

1. Differentiate between aerobes and facultative anaerobes.
2. What is mycotoxicosis?
3. Define starter culture.
4. Define Z value in sterilization.
5. What pathogen is most closely associated with poultry?
6. What is the concept of clean milk?
7. Define the term food additive.
8. Describe MBRT test.
9. Differentiate between food infection and food intoxication.
10. Define Asepsis.

**(10 × 1 = 10 Marks)**

P.T.O.

## SECTION – B

Answer any **eight** questions, Each carries **2** marks.

11. What are the major principles of food preservation?
12. List the benefits of fermented food.
13. Explain alkaline fermentation.
14. Explain the benefits and limitations of single cell proteins.
15. Describe ropiness of milk.
16. Why water activity is an important parameter?
17. What are aflatoxins? What food contains aflatoxins?
18. What is HACCP in dairy?
19. State the mechanism of action of sodium benzoate in food preservation.
20. Describe the role of salt and sugar in food preservation.
21. What are perishable food? How are they classified?
22. Enlist the probiotic characteristics of lactic acid bacteria.
23. Discuss the role of viruses in food born infections.
24. Explain chemical preservatives in food preservation.
25. Write a note on indicator organisms of microbial contamination.
26. Write a note on botulism.

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer any **six** questions, **Each** carries **4** marks.

27. Why meat spoil fast? Suggest method for its preservation.
28. Describe the process of beer production using microorganisms.
29. What are the factors that governing the type and growth of microbes in food?

30. State the significance of biochemical tests for food safety.
31. What are the types of spoilage reactions occurs in food?
32. Describe the characteristics of three common food borne diseases of bacterial origin.
33. Describe radiation as food preservation method.
34. How do you prevent food borne deceases?
35. How the spoilage occurs in eggs and write the different organisms involved in the process?
36. Discuss yeast as biological leavening agent.
37. Briefly explain the industrial production of penicillin.
38. Write a note on pasteurization. Explain two methods of pasteurization.

**(6 × 4 = 24 Marks)**

#### SECTION – D

Answer any **two** questions, Each carries **15** marks.

39. Give a detailed account on microbial vinegar production.
40. Describe different types of food preservation.
41. Describe the procedure for the analysis of cause of spoilage of canned food.
42. What is yoghurt? Name the microorganism used for this product. Describe their role and conditions for proper action.
43. Describe different type of fungi involved in food spoilage with examples.
44. Discuss mushroom cultivation in detail.

**(2 × 15 = 30 Marks)**

(Pages : 4)

N – 1823

Reg. No. : .....

Name : .....

**Sixth Semester B.Sc. Degree Examination, April 2022**

**Career Related First Degree Programme Under CBCSS**

**Group 2(b) : Biotechnology (Multimajor)**

**Core Course**

**BV 1643 : ORGANIC CHEMISTRY – II**

**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. **Each** question carries 1 mark.

1. What is meant by an essential amino acid?
2. State isoprene rule.
3. Which disease is caused by the deficiency of vitamin A?
4. What are sulpha drugs?
5. Give an example of Ziegler-Natta catalyst.
6. Give two examples for sex hormones.
7. Define auxochrome.
8. Give an example of nonessential amino acid.

P.T.O.

9. How many PMR signals are obtained for toluene?
10. What are the monomers present in Buna S.?

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer **any eight** questions from the following. **Each** question carries **2** marks.

11. Briefly explain denaturation of proteins.
12. How geraniol is isolated?
13. What is meant by Grignard reagent? Give any one method of preparation.
14. Explain saponification value.
15. What is meant by a zwitterions? Explain the isoelectric point.
16. How urea-formaldehyde resin is prepared?
17. How are vitamin classified? Give example for each class.
18. Explain Hofmann elimination reaction.
19. Explain the different types of electronic transitions occurring in UV-Visible spectroscopy.
20. What are steroid hormones? Briefly explain its functions.
21. What is meant by shielding and deshielding effect in NMR spectroscopy?
22. What is meant by finger print region in IR spectroscopy? Give the value of finger print region.
23. What is the importance of colour reactions of proteins?
24. What is meant by number average molecular weight of polymers?
25. Give one method of preparation and application of sulphathiazole.
26. Explain the classification of dyes based on structure.

**(8 × 2 = 16 Marks)**



## SECTION – C

Answer **any six** questions from the following. **Each** question carries **4** marks.

27. Explain the carbobenzoxy method of synthesis of peptides.
28. What are synthetic detergents? Explain briefly the detergent action.
29. Explain one synthesis and any three synthetic applications of diethyl malonate.
30. How will you interpret the PMR spectrum of pure ethanol and impure ethanol? Explain.
31. How are diazonium salts prepared? Discuss any two synthetic applications.
32. Give any two methods of preparation and two reactions of  $\alpha$ -aminoacids.
33. How will you synthesise alizarin and methyl orange? Give the equations also.
34. Explain Perkin reaction with mechanism.
35. What is meant by acid value and iodine value? How is it important in the analysis of fats and oils?
36. What is meant by chemical shift? Explain the factors affecting chemical shift.
37. What are enzymes? Briefly explain the specificity of enzymes with examples.
38. How will you distinguish between *o*-hydroxy benzoic acid and *p*-hydroxy benzoic acid using IR spectra? Explain.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer **any two** questions from the following. **Each** question carries **15** marks.

39. (a) Discuss about the structure of proteins.  
(b) Explain the structure and biological functions of DNA and RNA.
40. Discuss the method of isolation of coniine. Elucidate its structure.

41. Discuss the reduction of nitrobenzene under various reaction conditions and reagents.
42. Give any one method of synthesis for acetoacetic ester. Explain the tautomerism occurring in the molecule and its synthetic applications.
43. Explain the following reactions and give the mechanism of each reaction.
- (a) Meerwin-Ponndorf-Verley (MPV) reduction
  - (b) Reimer-Tiemann reaction
  - (c) Pinacol-Pinacolone rearrangement
44. (a) How will you distinguish between ethyl alcohol and diethyl ether on the basis of IR spectroscopy?
- (b) The NMR spectrum of a compound (A)  $C_5H_{12}$  gives only one singlet signal. What is the structure of A and give explanation for your answer?
- (c) Explain the red, blue, hyperchromic and hypochromic shifts in UV-Visible spectroscopy.
- (d) Explain McLafferty rearrangement.

**(2 × 15 = 30 Marks)**

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(Pages : 4)

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Reg. No. : .....

Name : .....

**Sixth Semester B.Sc. Degree Examination, April 2022**  
**Career Related First Degree Programme under CBCSS**  
**Group 2(b) Biotechnology (Multimajor)**  
**BV 1661.1 : HORTICULTURE**  
**(2018 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** the questions in a word or **one** or **two** sentences. **Each** question carries **1** mark.

1. What is Topiary?
2. Mention the use of *Sphagnum* in horticulture.
3. Give an example for a rooting hormone.
4. What is Pruning?
5. What is a bud?
6. What is Vermi wash?
7. Name a plant propagated by root cutting.
8. Define Mass flower arrangement

P.T.O.

9. Name a flower inducing hormone.
10. What is olericulture?

**(10 × 1 = 10 Marks)**

### SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks. (Answer not to exceed **one** paragraph)

11. What is potting mixture?
12. Discuss the importance of flower arrangement.
13. What are roof gardens?
14. What is a callus?
15. Mention the application of foliar sprays.
16. What is Ikebana? What is its importance?
17. Explain vegetative propagation by leaf cuttings.
18. What are the requirements for flower arrangements?
19. Define Parthenocarpy.
20. What are fungicides?
21. Mention any four common diseases of vegetable crops.
22. Write the significance of green house.
23. What is mist chamber?
24. What is Bonsai?

25. What is whip and tongue grafting?
26. Define rockery.

**(8 × 2 = 16 Marks)**

### SECTION – C

Answer any **six** questions. **Each** question carries **4** marks. (Answer not to exceed **120** words)

27. Explain types of soil.
28. Discuss the role of growth regulators in horticulture.
29. Explain the storage and marketing of fruits.
30. Give a note on weedicides.
31. Explain the various methods of irrigation.
32. What are the modes of indoor garden?
33. List any four garden tools and its uses.
34. Discuss the role of NPK in horticulture.
35. Differentiate chemical fertilizers and bio-fertilizers.
36. Brief a note on hydroponics.
37. What is approach grafting?
38. Explain the preparation of lawn.

**(6 × 4 = 24 Marks)**

### SECTION – D

Answer any **two** questions. **Each** question carries **15** marks. (Answer not to exceed three pages)

39. What is landscape gardening? Explain the major components of a landscape garden.
40. Describe the preservation and processing of fruits and vegetables
41. Define horticulture. Explain the scope and importance of horticulture.

42. With neat labelled diagrams, describe vegetative propagation by budding and layering.
43. Write an essay on common diseases affecting fruits and vegetable crops.
44. What is floristry? Give an account on dry flower arrangement.

**(2 × 15 = 30 Marks)**

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Reg. No. : .....

Name : .....

**Sixth Semester B.Sc. Degree Examination, April 2022**  
**Career Related First Degree Programme under CBCSS**  
**Group 2(b) Biotechnology (Multimajor)**  
**BV 1661.2 : MUSHROOM CULTIVATION AND MARKETING**  
**(2018 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in a word or **one** or **two** sentences. **Each** question carries **1** mark.

1. What are mushrooms?
2. What is biological efficiency in mushroom cultivation?
3. Define blanching
4. Name the conventional substrates used for oyster mushroom cultivation.
5. Expand NCMRT. Where it is located?
6. Mention the binomial name of milky mushroom.
7. Why mushrooms are called vegetable meat?
8. Give any one example for wild edible mushrooms seen in Kerala.
9. Name any one viral diseases in mushroom cultivation.
10. Which mushroom is the leading cultivated edible mushroom in the world?

**(10 × 1 = 10 Marks)**

P.T.O.

## SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks. (Answer not to exceed one paragraph).

11. What are toad stools? How they differ from mushrooms?
12. Name any two medicinal properties of mushroom.
13. What are mycotoxins? Give examples.
14. Briefly explain freez drying.
15. Name any two chemicals used for sterilization of substrates
16. Describe the parts of a typical mushroom.
17. Mention the advantages of eating mushroom in our diet.
18. How can we store mushroom upon harvest?
19. Name any two cereals used for mushroom spawn preparation
20. Suggest any two methods to control insect pests in mushrooms.
21. What are the different types of spawning practiced in mushroom cultivation?
22. List any two post harvest practices followed for mushrooms to retain its colour and shape.
23. In what way milky mushroom cultivation differ from oyster mushroom cultivation.
24. Name any two substrates used for *Pleurotus* mushroom cultivation.
25. How casing mixture is prepared for button mushroom cultivation?
26. Explain the life cycle of mushroom with a diagrammatic sketch.

**(8 × 2 = 16 Marks)**



## SECTION – C

Answer any **six** questions. Each question carries **4** marks (Answer should not exceed 120 words).

27. Write note on poisonous mushrooms.
28. Explain the significance of mushroom cultivation.
29. Comment on various methods of growing mushrooms
30. Briefly explain various steps of canning.
31. How to extend the shelf life of harvested mushrooms
32. Comment on various fungal weed molds of mushroom cultivation.
33. Discuss various strategies to enhance economic returns from mushrooms.
34. Discuss the contributions of four world's leading mushroom producing countries.
35. Mention any two problems and prospects of mushroom cultivation in Kerala.
36. Write note on medicinal mushrooms.
37. What is a spent substrate? Mention any three uses of spent substrate.
38. Explain the nutritive and medicinal values of mushrooms.

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. Each questions carries **15** marks (answers not to exceed three pages)

39. Explain the various stages of button mushroom cultivation. In what way button mushroom cultivation differ from oyster mushroom cultivation?
40. Write an essay on post harvest processing, storage and value addition in mushrooms.

41. Comment on various pest and diseases of cultivated mushrooms and suggest their control measures.
42. What are substrates in mushroom cultivation? Explain in details on different methods of substrate sterilization practices for oyster mushroom cultivation.
43. Discuss in detail on the infrastructural requirements for starting a mushroom cultivation unit.
44. Write an essay on the mushroom spawn production and quality management criteria followed for good spawn.

**(2 × 15 = 30 Marks)**

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