Exam. Code : 107402
Subject Code : 2270

B.Sc. (Bio Technology) 2nd Semester

ZOOLOGY—B

Paper—BT–1

Time Allowed—3 Hours] [Maximum Marks—40

Note :— All questions of Section A are compulsory. Attempt any **FIVE** questions from Section B and **TWO** questions from Section C.

SECTION—A

1. Give short answers. Each question carries 1 mark.
   (a) Write the function of thyrotropin.
   (b) What helps to regulate the level of blood calcium ?
   (c) Define osmoregulation.
   (d) What is the role of corpus luteum ?
   (e) Draw a well labeled diagram of mammalian eye.
   (f) What are proprioceptors ?
   (g) Name the proteins associated with actin filaments.
   (h) What is the function of cerebellum ? 8×1=8

SECTION—B

2. Write a note on islets of Langerhans. 4
3. Give an account of evolution of urogenital ducts in males. 4
4. How do mammals maintain water balance ? 4

5. Explain the structure of hind brain. 4

6. How are action potentials conducted along the axon ? 4

7. Write a note on adrenal medulla. 4

8. Explain the role of calcium in controlling actin myosin interactions. 4

9. Discuss the various types of jaw suspensions. 4

SECTION—C

10. Explain the structure and function of anterior pituitary. 6

11. Describe the structure of skeletal muscles. What is the mechanism of muscle contraction ? 6

12. Explain the synaptic transmission of nerve impulse with the help of a diagram. 6

13. Discuss the structure and function of mammalian kidney giving a well labeled diagram. 6

Exam. Code : 107402
Subject Code : 2271

B.Sc. (Bio-Technology) 2nd Semester

BOTANY—B

Paper—BT-2

Time Allowed—Three Hours] [Maximum Marks—40

Note :— Attempt **ALL** the questions from Section A, **FIVE** questions from Section B and **TWO** questions from Section C. Draw neatly labelled diagrams wherever required. Marks for each question are indicated in the paper.

SECTION—A

1. Write about a paragraph (upto **1/3** of a page) on each of the following :— 1×8=8

   (i) Bryophytes with examples

   (ii) Gynoecium

   (iii) Silicula

   (iv) Breeder seed

   (v) Grain and seed

   (vi) Zygomorphic

   (vii) Lemma and glumes

   (viii) Species.

SECTION—B

Note :— Attempt **FIVE** of the following questions, each in about **2** pages of the answer book. 4×5=20

2. Write salient features of Bentham and Hooker system of classification.
3. Explain morphological features of *Helianthus*.
4. Write general characters of family Leguminosae.
5. Define seed biology. Explain different methods of seed production.
6. Explain reproductive characters of Lichens.
7. Discuss evolutionary status of family Compositae.
8. Discuss vegetative structure of *Ranunculus*.
9. Explain different classes of seeds.

SECTION—C

Note :— Attempt **TWO** questions from this section, limiting your answer to about **5** pages. 6×2=12

10. Differentiate between Natural and Artificial systems of classification.
11. Explain general characters of family Apiaceae with reference to genus *Coriandrum sativum L.*
12. Discuss general characters of genus *Acacia* of family Leguminosae.
13. Explain process and requirement of seed certification.

Exam. Code : 107402
Subject Code : 2272

B.Sc. (Bio-Technology) 2nd Semester

INORGANIC CHEMISTRY—B

Paper—BT-3

Time Allowed—Three Hours] [Maximum Marks—40

SECTION—A

Note :— **ALL** questions are compulsory. Each question carries **1** mark.

1. Give two examples of metal carbonyls which undergo dimerisation in order to obey 18-electron rule.
2. N_2 is isoelectronic with CO, but it is poor σ-donor than CO. Give suitable reason.
3. Draw the structure of [18] crown-6 and cryptand [3.3.3].
4. What do you understand by macrocyclic ligand ? Give one example.
5. What do you understand by thermodynamic stability of a complex ?
6. Draw the structure of porphyrin.
7. What is Hill constant ? Give its significance.
8. Write chemical equations involved in photosynthesis.

SECTION—B

Note :— Attempt any **FIVE** questions. Each question carries **4** marks.

1. What are metal carbonyls ? Also discuss bonding in linear M-CO group in metal carbonyls.
2. How will you prepare $Fe(CO)_5$? Write the possible products obtained when $Fe(CO)_5$ reacts with :
   (i) OH^-, (ii) C_5H_6 and (iii) PPh_3.
3. What do you understand by phase transfer catalysis ? Also discuss its applications.
4. Define cryptands. Give two examples. Also give two methods to prepare cryptands.
5. Chelation increases the stability of the complex. Explain with suitable examples.
6. Derive relationship between stepwise and cumulative stability constants.
7. Briefly describe the role of zinc containing enzymes in the biological systems.
8. Discuss the role of following metals in the biological systems :
   (a) Calcium
   (b) Chromium
   (c) Magnesium
   (d) Cobalt.

SECTION—C

Note :— Attempt any **TWO** questions. Each question carries **6** marks.

1. Write brief notes on :—
   (a) Metal complexes containing dinitrogen as ligands. 3
   (b) Metal carbonyl hydrides. 3
2. Discuss in detail various types of cation-binding hosts with two examples each. Also briefly describe various interactions responsible for binding of host molecules and metal ions.
3. (a) What is the difference between the terms kinetic stability and thermodynamic stability ? 3
   (b) How does the nature of ligands affect the stability of complex ? 3
4. Draw and discuss the structure of hemoglobin. Describe the important role of hemoglobin in biological systems.

Exam. Code : 107402
Subject Code : 2273

B.Sc. (Biotechnology) 2nd Semester

ORGANIC CHEMISTRY—B

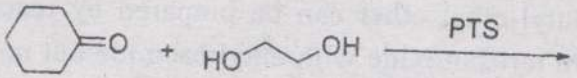
Paper—BT-4

Time Allowed—Three Hours] [Maximum Marks—40

SECTION—A

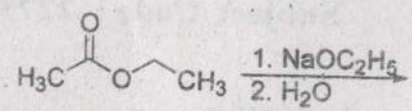
Note :— Attempt **ALL** the questions. All questions carry equal marks.

1. Although acetylene is acidic in nature, yet it doesn't react with NaOH, why ?
2. How will you convert ethyne to acetaldehyde?
3. Using Williamson's synthesis, how will you synthesize cyclohexylmethyl ether ?
4. Write a short note on crown ether.
5. Aldehydes undergo nucleophilic addition reactions more easily than ketones, explain.
6. Complete the following reaction :



7. Benzoyl chloride gets hydrolyzed at a much slower rate than acetyl chloride, why ?

8. Complete the following reaction :

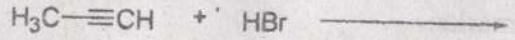


1×8=8

SECTION—B

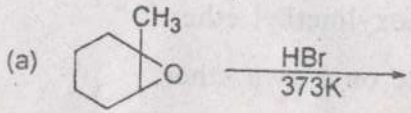
Note :— Attempt any **FIVE** questions. Each question carries equal marks.

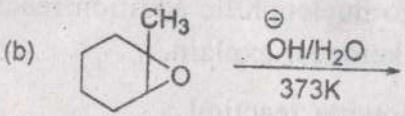
9. Provide the structure and mechanism of following reaction :



10. Alkynes are less reactive than alkenes towards electrophilic addition reactions. Explain.

11. Predict the products in the following reactions with a suitable mechanism :





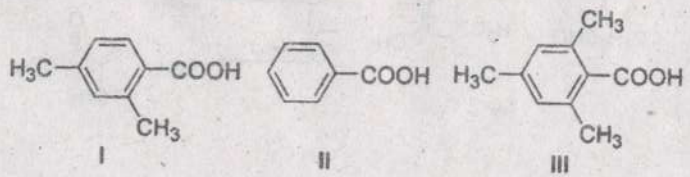
12. Tert-butyl-ethyl ether can be prepared by reacting sodium tert-butoxide with ethyl bromide but not by reacting tert-butyl bromide with sodium ethoxide. Why?

13. Explain why in acid catalyzed halogenations of 2-butanone, halogenation preferentially occurs at methylene rather than methyl group ?

14. How would you prepare 2-methyl-2-pentene using Wittig reaction ?

15. Discuss Hofmann bromamide reaction with a suitable mechanism.

16. Arrange the following in decreasing order of acid catalyzed esterification and provide a suitable reason :



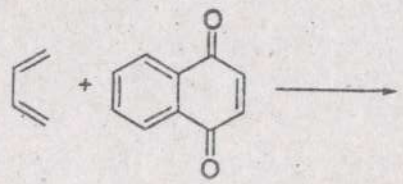
5×4=20

SECTION—C

Note :— Attempt any **TWO** questions. Each question carries equal marks.

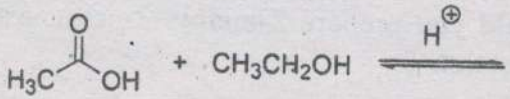
17. (a) With mechanism, how will you convert but-2-yne to but-2-ene in the presence of $Na/liq.NH_3$? 4

(b) Complete the following reaction :



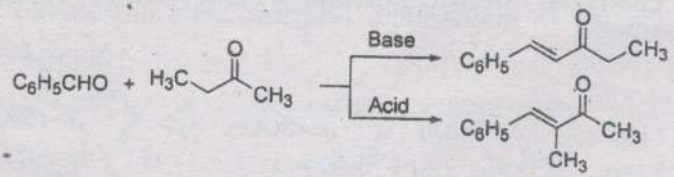
2

18. Provide the structure of product along with a suitable mechanism for the following reaction :



6

19. How do you explain the outcome of following reaction in acidic and basic media :



6

20. With mechanism, state and explain Dieckmann condensation reaction. 6

Exam. Code : 107402
Subject Code : 2272

B.Sc. (Bio-Technology) 2nd Semester

INORGANIC CHEMISTRY—B

Paper—BT-3

Time Allowed—Three Hours] [Maximum Marks—40

SECTION—A

Note :— **ALL** questions are compulsory. Each question carries **1** mark.

1. Give two examples of metal carbonyls which undergo dimerisation in order to obey 18-electron rule.
2. N_2 is isoelectronic with CO, but it is poor σ-donor than CO. Give suitable reason.
3. Draw the structure of [18] crown-6 and cryptand [3.3.3].
4. What do you understand by macrocyclic ligand ? Give one example.
5. What do you understand by thermodynamic stability of a complex ?
6. Draw the structure of porphyrin.
7. What is Hill constant ? Give its significance.
8. Write chemical equations involved in photosynthesis.

SECTION—B

Note :— Attempt any **FIVE** questions. Each question carries **4** marks.

1. What are metal carbonyls ? Also discuss bonding in linear M-CO group in metal carbonyls.
2. How will you prepare $Fe(CO)_5$? Write the possible products obtained when $Fe(CO)_5$ reacts with :
   (i) OH^-, (ii) C_5H_6 and (iii) PPh_3.
3. What do you understand by phase transfer catalysis ? Also discuss its applications.
4. Define cryptands. Give two examples. Also give two methods to prepare cryptands.
5. Chelation increases the stability of the complex. Explain with suitable examples.
6. Derive relationship between stepwise and cumulative stability constants.
7. Briefly describe the role of zinc containing enzymes in the biological systems.
8. Discuss the role of following metals in the biological systems :
   (a) Calcium
   (b) Chromium
   (c) Magnesium
   (d) Cobalt.

SECTION—C

Note :— Attempt any **TWO** questions. Each question carries **6** marks.

1. Write brief notes on :—
   (a) Metal complexes containing dinitrogen as ligands. 3
   (b) Metal carbonyl hydrides. 3
2. Discuss in detail various types of cation-binding hosts with two examples each. Also briefly describe various interactions responsible for binding of host molecules and metal ions.
3. (a) What is the difference between the terms kinetic stability and thermodynamic stability ? 3
   (b) How does the nature of ligands affect the stability of complex ? 3
4. Draw and discuss the structure of hemoglobin. Describe the important role of hemoglobin in biological systems.

Exam. Code : 107402
Subject Code : 2274

B.Sc. (Bio Technology) 2nd Semester
BIOSTATISTICS
Paper – BT-5

Time Allowed—3 Hours] [Maximum Marks—40

Attempt as per directions.

SECTION–A

Note :– All questions are compulsory. 1×8=8

1. Define and explain the following :

   (i) Mean

   (ii) Mode

   (iii) Probability

   (iv) Samples

   (v) Correlation

   (vi) Regression

   (vii) Null hypothesis

   (viii) Attributes.

SECTION–B

Note :– Attempt any **five** questions. 5×4=20

2. Find out the standard deviation of a sample 16, 13, 17 and 22.

3. What is covariance ? How will you determine it ?

4. What is conditional probability ? How will you determine it ?

5. What is Bayes theorem ? Explain.

6. What is linear correlation ? Explain.

7. What is linear regression ? Explain.

8. What is goodness of fit ? Explain.

9. What is association of attributes ? Explain.

SECTION–C

Note :– Attempt any **two** questions. 6×2=12

10. Find the standard deviation of incubation period of small pox in 50 patients of the following data :

Period	10	11	12	13	14	15	16
No. of Patients	2	7	11	15	10	4	1

11. What is the probability of getting at most 8 heads in 10 coins tossed together ?

12. Calculate the correlation coefficient between x and y from the following data :

x	5	9	13	17	21
y	12	20	25	33	35

13. From the table given below whether the color of son's eyes are associated with that of father's eyes ?

		Eyes colour of sons	
		Not Light	Light
Eyes colour of fathers	Not Light	230	148
	Light	151	471

($\psi^2_{0.05}$, d.f. 1 = 3.84)

Exam. Code : 107402
Subject Code : 2275

B.Sc. (Bio-Technology) 2nd Semester

PUNJABI COMPULSORY

Paper : BT–6 (i)

Time Allowed—3 Hours] [Maximum Marks—50

ਨੋਟ :- ਸਾਰੇ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹਨ।

1. ਹੇਠ ਲਿਖੇ ਨਿਬੰਧਾਂ ਵਿਚੋਂ ਕਿਸੇ **ਇੱਕ** ਨਿਬੰਧ ਦਾ ਸਾਰ ਆਪਣੇ ਸ਼ਬਦਾਂ ਵਿੱਚ ਲਿਖੋ :
   (ੳ) ਕੰਪਿਊਟਰ
   (ਅ) ਮਨੁੱਖੀ ਅਧਿਕਾਰ। 10
2. ਵਰਿਆਮ ਸਿੰਘ ਰਚਿਤ ਕਹਾਣੀ 'ਦਲਦਲ' ਵਿੱਚ ਪੇਸ਼ ਵਿਸ਼ੇ ਵਸਤੂ ਨੂੰ ਬਿਆਨ ਕਰੋ। 10
3. ਪੜਨਾਂਵ ਸ਼੍ਰੇਣੀ ਬਾਰੇ ਵਿਸਥਾਰ-ਪੂਰਵਕ ਜਾਣਕਾਰੀ ਦਿਓ। 10
4. ਹੇਠਾਂ ਲਿਖੇ ਵਿਸ਼ਿਆਂ ਵਿੱਚੋਂ ਕਿਸੇ **ਇੱਕ** ਵਿਸ਼ੇ ਤੇ ਪੈਰਾ ਰਚੋ :
   (ੳ) ਅਨਪੜ੍ਹਤਾ
   (ਅ) ਅਜੋਕੀ ਵਿਦਿਅਕ ਪ੍ਰਣਾਲੀ
   (ਏ) ਪ੍ਰਦੂਸ਼ਣ ਦੀ ਸਮੱਸਿਆ। 5
5. ਹੇਠ ਲਿਖਿਆ ਪੈਰਾ ਪੜ੍ਹ ਕੇ ਅੰਤ ਵਿੱਚ ਦਿੱਤੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ ਲਿਖੋ :

   ਗੁਰੂ ਜੀ ਬੜੀ ਸੋਚ ਵਿਚਾਰ ਪਿੱਛੇ ਇਸ ਸਿੱਟੇ ਤੇ ਪੁੱਜੇ ਕਿ ਤਾਲੀਮ ਹਾਸਿਲ ਕਰਨ ਦਾ ਸ਼ੌਕ ਸਿੱਖਾਂ ਵਿੱਚ ਆਮ ਹੋਣਾ ਚਾਹੀਦਾ ਹੈ। ਉਹ ਆਪ ਹਿੰਦੀ, ਸੰਸਕ੍ਰਿਤ, ਫਾਰਸੀ, ਅਰਬੀ ਤੇ ਪੰਜਾਬੀ ਦੇ ਉਚ ਵਿਦਵਾਨ ਸਨ। ਉਹਨਾਂ ਨੇ ਕਵੀ ਦਰਬਾਰਾਂ ਦਾ ਰਿਵਾਜ਼ ਇਸ ਲਈ ਚਲਾਇਆ ਕਿ ਲੋਕਾਂ ਨੂੰ ਵਿਦਿਆ ਦਾ ਸ਼ੌਕ ਪੈਦਾ

ਹੋ ਜਾਵੇ। ਇਹਨਾਂ ਦਰਬਾਰਾਂ ਵਿੱਚ ਬੜੇ ਉੱਚ ਕੋਟੀ ਦੇ ਸ਼ਾਇਰ ਇਕੱਠੇ ਹੁੰਦੇ ਸਨ। ਕਵਿਤਾ ਅਤੇ ਲੇਖਣੀ ਦੇ ਮੁਕਾਬਲੇ ਹੁੰਦੇ। ਜਿਹੜੇ ਪਹਿਲੇ ਨੰਬਰਾਂ ਤੇ ਰਹਿੰਦੇ ਉਹਨਾਂ ਨੂੰ ਗੁਰੂ ਦਰਬਾਰ ਤੋਂ ਸਿਰੋਪਉ ਤੇ ਇਨਾਮ ਮਿਲਦਾ। ਗੁਰੂ ਜੀ ਨੇ ਆਪ ਆਪਣੇ ਜੀਵਨ ਦੇ ਕੁਝ ਸਾਲ ਖਾਲਸਾ ਪੰਥ ਸਜਾਉਣ ਤੋਂ ਪਹਿਲਾਂ ਇਕਾਂਤ ਵਿੱਚ ਪਹਾੜੀ ਟਿੱਲੇ ਤੇ ਗੁਜ਼ਾਰੇ ਸਨ। ਇਸ ਸਮੇਂ ਆਪ ਨੇ ਕਈ ਰਚਨਾਵਾਂ ਰਚੀਆਂ ਅਤੇ ਹਿੰਦੀ, ਸੰਸਕ੍ਰਿਤ ਆਦਿ ਗ੍ਰੰਥਾਂ ਦੇ ਤਰਜ਼ਮੇ ਕਰਵਾਏ। ਅਫਸੋਸ ਇਹ ਕਿ ਇਹ ਭਰੀ ਵਿਦਿਆ ਦਾ ਖਜ਼ਾਨਾ ਅਨੰਦਪੁਰ ਦੀ ਲੜਾਈ ਮਗਰੋਂ ਸਰਸਾ ਨਦੀ ਦੀ ਭੇਂਟ ਹੋ ਗਿਆ।

ਪ੍ਰਸ਼ਨ :

1. ਸੋਚ ਵਿਚਾਰ ਪਿੱਛੋਂ ਗੁਰੂ ਜੀ ਕਿਸ ਸਿੱਟੇ ਤੇ ਪੁੱਜੇ ?
2. ਗੁਰੂ ਜੀ ਕਿਹੜੀ-ਕਿਹੜੀ ਭਾਸ਼ਾ ਦੇ ਵਿਦਵਾਨ ਸਨ ?
3. ਕਵੀ ਦਰਬਾਰ ਕਿਹੜੇ ਉਦੇਸ਼ ਨਾਲ ਸ਼ੁਰੂ ਕੀਤੇ ਗਏ ?
4. ਕਵੀਆਂ ਨੂੰ ਉਤਸ਼ਾਹਿਤ ਕਰਨ ਲਈ ਕੀ ਕੁਝ ਕੀਤਾ ਜਾਂਦਾ ਸੀ ?
5. ਵਿਦਿਆ ਦਾ ਕਿਹੜਾ ਖਜ਼ਾਨਾ ਸਰਸਾ ਨਦੀ ਵਿੱਚ ਤਬਾਹ ਹੋ ਗਿਆ ? 5

6. ਹੇਠ ਲਿਖੇ ਮੁਹਾਵਰਿਆਂ ਅਤੇ ਅਖਾਣਾਂ ਵਿੱਚੋਂ **ਪੰਜ** ਮੁਹਾਵਰੇ ਅਤੇ **ਪੰਜ** ਅਖਾਣਾਂ ਨੂੰ ਵਾਕਾਂ ਵਿੱਚ ਇਸ ਤਰ੍ਹਾਂ ਵਰਤੋ ਕਿ ਇਹਨਾਂ ਦੇ ਅਰਥ ਸਪੱਸ਼ਟ ਹੋ ਜਾਣ :

(ੳ) ਅੱਖਾਂ ਵਿੱਚ ਰੜਕਣਾ, ਕੰਨਾਂ ਦਾ ਕੱਚਾ ਹੋਣਾ, ਛਿੱਲ ਲਾਹੁਣਾ, ਸੱਤੀਂ ਕੱਪੜੀ ਅੱਗ ਲੱਗਣਾ, ਨੱਕ ਨਾਲ ਚਣੇ ਚਬਾਉਣਾ, ਲਾਲ ਪੀਲਾ ਹੋਣਾ, ਸੁੰਨ ਰਹਿ ਜਾਣਾ।

(ਅ) ਆਪੇ ਮੈਂ ਰੱਜੀ ਪੁੱਜੀ ਆਪੇ ਮੇਰੇ ਬੱਚੇ ਜੀਣ, ਵੇਲੇ ਦੀ ਨਮਾਜ਼ ਕੁਵੇਲੇ ਦੀਆਂ ਟੱਕਰਾਂ, ਘਰ ਦਾ ਜੋਗੀ ਜੋਗੜਾ ਬਾਹਰ ਦਾ ਜੋਗੀ ਸਿੱਧ, ਛੱਜ ਤਾਂ ਬੋਲੇ ਛਾਣਨੀ ਕੀ ਬੋਲੇ, ਟਾਟ ਦੀ ਜੁੱਲੀ ਰੇਸ਼ਮ ਦਾ ਬਖੀਲਾ, ਸੱਦੀ ਨਾ ਬੁਲਾਈ ਮੈਂ ਲਾੜੇ ਦੀ ਤਾਈ, ਢਿੱਡ ਭਰਿਆ ਕੰਮ ਸਰਿਆ। 5+5=10

Exam. Code : 107402
Subject Code : 2276

B.Sc. (Bio Technology) 2nd Semester

ਮੁੱਢਲੀ ਪੰਜਾਬੀ

Paper : BT–6 (ii)

Time Allowed—3 Hours] [Maximum Marks—50

ਨੋਟ :- ਸਾਰੇ ਸਵਾਲ ਕਰਨੇ ਜ਼ਰੂਰੀ ਹਨ।

1. (ੳ) ਸਮਾਸੀ ਸ਼ਬਦ ਕੀ ਹੁੰਦੇ ਹਨ ? ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਵਿੱਚ ਵਰਤੇ ਜਾਂਦੇ ਕੋਈ **ਪੰਜ** ਸਮਾਸੀ ਸ਼ਬਦ ਲਿਖੋ। 5

(ਅ) ਅਗੇਤਰ ਕੀ ਹੁੰਦੇ ਹਨ ? ਹੇਠ ਲਿਖੇ ਅਗੇਤਰਾਂ ਦੀ ਵਰਤੋਂ ਕਰਕੇ ਮਿਸ਼ਰਤ ਸ਼ਬਦਾਂ ਦੀ ਰਚਨਾ ਕਰੋ :

ਅਣ, ਦੁਰ, ਪਰ, ਅਪ, ਗੈਰ 5

(ੲ) ਪਿਛੇਤਰ ਕੀ ਹੁੰਦੇ ਹਨ ? ਹੇਠ ਲਿਖੇ ਪਿਛੇਤਰਾਂ ਦੀ ਵਰਤੋਂ ਕਰਕੇ ਮਿਸ਼ਰਤ ਸ਼ਬਦਾਂ ਦੀ ਰਚਨਾ ਕਰੋ :

ਹੀਣ, ਖ਼ਾਨਾ, ਦਾਨ, ਮੰਦ, ਸ਼ਾਲਾ 5

(ਸ) (i) ਪੰਜਾਬ ਦੀਆਂ ਰੁਤਾਂ ਦੇ ਨਾਮ ਲਿਖੋ।

(ii) ਬਾਰ੍ਹਾਂ ਮਹੀਨਿਆਂ ਦੇ ਨਾਮ ਪੰਜਾਬੀ ਵਿੱਚ ਲਿਖੋ।

(iii) ਦਿਨਾਂ ਦੇ ਨਾਂ ਲਿਖੋ।

(iv) ਸੱਠ ਤੋਂ ਸੱਤਰ ਤੱਕ ਦੀ ਗਿਣਤੀ ਸ਼ਬਦਾਂ ਵਿੱਚ ਲਿਖੋ।

(v) ਕਿੱਤਾਕਾਰੀ ਨਾਲ ਸੰਬੰਧਤ ਕੋਈ ਪੰਜ ਸ਼ਬਦ ਲਿਖੋ।

5×1=5

2. (ੳ) ਭਾਸ਼ਾ ਦੀ ਪਰਿਭਾਸ਼ਾ ਲਿਖੋ। ਇਸ ਦੀ ਮਨੁੱਖੀ ਜੀਵਨ ਵਿੱਚ ਕੀ ਅਹਿਮੀਅਤ ਹੈ ? 5

(ਅ) ਮਾਤ ਭਾਸ਼ਾ ਬਾਰੇ ਜਾਣਕਾਰੀ ਦਿਉ। 5

(ਏ) ਗੁਰਮੁਖੀ ਲਿਪੀ ਦੀਆਂ ਮੁੱਖ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ ਦੱਸੋ। 5

3. (ੳ) ਮਿਸ਼ਰਤ ਵਾਕ ਦੀ ਪਰਿਭਾਸ਼ਾ ਲਿਖੋ ਅਤੇ ਪੰਜ ਮਿਸ਼ਰਤ ਵਾਕ ਲਿਖੋ। 5

(ਅ) ਕਾਰਜ ਦੇ ਆਧਾਰ ਉੱਤੇ ਪੰਜਾਬੀ ਵਾਕਾਂ ਦੀ ਵੰਡ ਕਰੋ ਅਤੇ ਇਨ੍ਹਾਂ ਦੀਆਂ ਉਦਾਹਰਨਾਂ ਵੀ ਲਿਖੋ। 5

(ਏ) ਬਾਜ਼ਾਰ ਵਿੱਚ ਵਰਤੇ ਜਾਂਦੇ ਪੰਜ ਵਾਕ ਬਣਾਓ। 5

Exam. Code : 107402
Subject Code : 2278

B.Sc. (Biotechnology) 2nd Semester

GENERAL MICROBIOLOGY-B

Paper–BT-8

Time Allowed—3 Hours] [Maximum Marks—40

Note : – Attempt as per directed.

SECTION–A

(All questions are compulsory) 1×8=8

1. Define and explain the following :

   (i) Diauxic growth

   (ii) Sporulation

   (iii) Name two plant viruses

   (iv) Name two animal viruses

   (v) Pathogenicity

   (vi) Toxigenicity

   (vii) Fermentation

   (viii) Bioprocess.

SECTION–B

(Attempt any **five** questions) 5×4=20

2. Design an experiment to achieve diauxic growth.

3. Diagrammatically explain the sporulation of bacteria.

4. Classify the viruses based on transcription.

5. Discuss and explain the replication processes of herpes simplex.

6. Discuss and explain the natural resistance mechanism against microorganisms.

7. Discuss and explain non specific defence mechanisms.

8. Discuss the TCA cycle.

9. Discuss the ETC.

SECTION–C

(Attempt any **two** questions) 6×2=12

10. Discuss and explain the regeneration process of bacteria.

11. Discuss and explain the Herpes simplex virus replication processes.

12. Discuss the microbial pathogenicity in adhesion and invasiveness

13. Discuss and explain how a heterologous protein can be produced by a bacteria.

Exam. Code : 107402
Subject Code : 2279

B.Sc. (Bio Technology) 2nd Semester

BIOCHEMISTRY-II

Paper—BT-9

Time Allowed—3 Hours] [Maximum Marks—40

Note :— (1) Attempt **ALL** parts from Section-A. Each Part carries **1** mark.

(2) Attempt any **FIVE** questions from Section-B. Each question carries **4** marks.

(3) Attempt any **TWO** questions from Section-C. Each question carries **6** marks.

SECTION—A

1. (i) Phosphoglycerides.

(ii) Glycosphingolipids.

(iii) Proline.

(iv) Secondary structure of protein.

(v) Cofactors.

(vi) Vitamin-D.

(vii) Secretory glands.

(viii) Growth hormone.

SECTION—B

2. Classify lipids and fatty acids.
3. Steroids.
4. Mention the biological role of protein.
5. Discuss different forces which stabilize protein structure.
6. Mention the deficiency symptoms of vitamin-C.
7. Discuss about the fat soluble vitamins.
8. Discuss about disorder associated with steroid hormones.
9. Write a short note on amino acid hormones.

SECTION—C

10. Discuss the general function of lipid and provide an overview of their classification.
11. Discuss various structural organizations of proteins.
12. What are fat and water soluble vitamins ? Discuss their deficiency symptoms.
13. Discuss major classes of hormones and their role in human.

Exam. Code : 107402
Subject Code : 2280

B.Sc. (Bio Technology) 2nd Semester

DRUG ABUSE : PROBLEM, MANAGEMENT AND PREVENTION

Time Allowed—Three Hours] [Maximum Marks—50

SECTION—A

It consists of **FIVE** short answer type questions. Candidates will be required to attempt **THREE** questions. Each question carries **5** marks. Answer to any of the question should not exceed **2** pages. (15 marks)

5×3=15

1. Discuss the consequences of Drug Abuse with special reference to law and order problem.
2. Write a short note on behavioral and cognitive therapy.
3. Discuss the role of publicity and media in the prevention of Drug Abuse.
4. How to do Random Testing on students as a preventive measure ?
5. Describe Environmental Intervention as management of Drug Abuse.

SECTION—B

It consists of **FOUR** essay type questions. Candidates will be required to attempt **TWO** questions. Answer to any of the question should not exceed **4** pages. (20 marks) 10×2=20

6. Discuss the consequences of Drug Abuse for Individual.
7. Discuss the role of counselling as Psycho-Social management.
8. Write about the smuggling of Drugs. What measures can be used to prevent it ?
9. Do you think role of family can help in preventing drug abuse ? Explain.

SECTION—C

It consists of **TWO** questions. Candidates will be required to attempt **ONE** question. Answer to be question should not exceed **5** pages. (15 marks) 15×1=15

10. Discuss the role of medication for treatment of drug abuser and reduce the withdrawal effects.
11. Describe the role of media with special reference to educational and awareness programmes for prevention of Drug Abuse.

Exam. Code : 107404
Subject Code : 2301

B.Sc. (Bio Technology) 4th Semester

BT-I : PHYSICAL CHEMISTRY—B

Time Allowed—Three Hours] [Maximum Marks—40

Note :—The question paper consists of **THREE** sections. Section A contains **8** very short answer type questions (Q. Nos. **1** to **8**), each carrying **1** mark. Section B contains **8** short answer type questions (Q. Nos. **9** to **16**), each carrying **4** marks. Section C contains **4** essay type questions (Q. Nos. **17** to **20**), each carrying **6** marks. Attempt all the questions from Section A, any **5** questions from Section B and any **2** questions from Section C.

SECTION—A

Each question carries **1** mark.

1. Give the significance of EMF.
2. Write down the electrode reaction for Quinhydrone electrode.
3. Define activity coefficient. Name a method used to determine activity coefficient.

4. Define rate constant and give its units for third order reaction.
5. Define threshold energy.
6. What is turn over number ?
7. What do you understand from buffer index ?
8. What is cell constant ? Give its units.

SECTION—B

Each question carries **4** marks.

9. Calculate the liquid junction potential at 25°C between two solutions of HCl having mean ionic activities of 0.01 and 0.001, respectively. The transference number of H^+ ion in HCl may be taken as 0.83.
10. Discuss the effect of concentration of electrolyte on electrode potential.
11. (a) Differentiate between order and molecularity of a reaction.
    (b) Enlist and discuss briefly the factors influencing the rate of reaction.
12. Derive the integrated rate expression for the first order reaction $A \rightarrow P$.
13. What are chain reactions ? Elaborate the chain reaction between $H_{2(g)}$ and $Br_{2(g)}$.

14. Explain the Kohlraush law. Discuss its application for calculation of molar conductance of weak electrolytes at infinite dilution.
15. A moving boundary experiment was carried out with 0.01 M solution of KCl (κ = 1.29 S m^{-1}), using $CdCl_2$ as the indicator electrolyte. A current of 521 mA was passed through the tube of 0.230 cm^2 cross-sectional area. It was observed that the boundary moved through 4.16 cm in one hour. Calculate the mobility of the K^+.
16. Write a note on experimental determination of transference number using Hittorf's method.

SECTION—C

Each question carries **6** marks.

17. Write a brief note on (a) concentration cells; and (b) standard hydrogen electrode.
18. What is steady-state approximation ? Using it, derive Michaelis-Menton equation for enzyme catalysis.
19. Explain the Debye Huckel theory of activity coefficients.
20. (a) Calculate the pH of 1×10^{-7} M solution of HCl at 25°C. Take $K_w = 10^{-14}$ mol^2 dm^{-6}.
    (b) Write a short note on heterogeneous catalysis.

Exam. Code : 107404

Subject Code : 2303

B.Sc. (Bio Technology) 4th Semester

BIOCHEMISTRY-IV

Paper–BT-3

Time Allowed—3 Hours] [Maximum Marks—40

SECTION–A

Note :— Attempt **all** questions. Each question carries 1 mark.

1. Where in the cell synthesis and degradation of Fatty acid takes place ?
2. What is the fate of glycerol in degradation of Triacylglycerol ?
3. What is the role of Carnitine in Fatty acid oxidation ?
4. What are ketone bodies ?
5. Explain briefly what are ketogenic amino acids
6. Draw the structure of any one aromatic amino acid.
7. Draw the structure of pyrimidine ring and identify the sources which provide the different atoms of pyrimidine.
8. Differentiate between Adenine and Adenosine.

SECTION–B

Note :— Attempt any **five** questions, each question carries **4** marks.

1. Explain Urea Cycle and indicate the reactions occuring in cytosol and mitochondria.
2. What are Transamination reaction ? Explain its importance in amino acid degradation.
3. Describe Salvage Pathway of nucleotides.
4. Explain the regulation of biosynthesis of Purine and Pyrimidine bases.
5. Draw a well labelled diagram and write reactions how fatty acids are transported to mitochondria from cytosol for oxidation.
6. Write a note on regulation of Lipid metabolism.
7. Explain the role of lipoproteins in regulating Cholesterol levels in the body.
8. Explain the degradation of Triacylglycerol.

SECTION–C

Note :—Attempt any **two** questions, each question carries **6** marks.

1. Write a note on biosynthesis of essential amino acids. Briefly explain its regulation.

2. Discuss the biosynthesis of Purine and Pyrimidine bases.
3. Explain different steps in degradation of saturated Fatty acids. How is it different from degradation of unsaturated fatty acid ?
4. Explain biosynthesis of Cholesterol.

Exam. Code : 107404
Subject Code : 2304

B.Sc. (Bio-Technology) 4th Semester
BT-4 : CELL BIOLOGY—B

Time Allowed—3 Hours] [Maximum Marks—40

SECTION—A

Note :— Attempt **ALL** the questions. Answer to any question should not exceed **1/3** of a page.

1. Define actin filaments.
2. What are dictyosomes ?
3. Define nucleolus.
4. Give the functions of peroxysomes.
5. What do you understand by amitosis ?
6. Define cilia.
7. Define a pleuripotent cell.
8. What do you understand by necrosis ? 8×1=8

SECTION—B

Note :— Attempt any ***five*** questions. Answer to any question should not exceed **2** pages.

1. Write a short note on rough endoplasmic reticulum.
2. Describe the structure and functions of ribosomes.
3. What are the characteristic structural features of mitochondria that aid in their identification ?

4. What are the functions of chloroplasts ?
5. Define mitosis. Give the significance of mitosis.
6. Write a note on flagellar locomotion.
7. Briefly describe artificial creation of 'cells'.
8. Describe apoptosis and its significance. 5×4=20

SECTION—C

Note :— Attempt any *two* questions. Answer to any question should not exceed **5** pages.

1. With the help of a labelled diagram, describe the ultrastructure of cell membrane. Discuss its important functions.
2. Describe in detail the ultrastructure of nucleus. Discuss its significance.
3. Describe in detail the process of meiosis with the help of diagrams. What is the significance of this process ?
4. Describe cell differentiation in plants and animals. 2×6=12

Exam. Code : 107404
Subject Code : 2305

B.Sc. (Bio Technology) 4th Semester

BT-5 IMMUNOTECHNOLOGY

Time Allowed—3 Hours] [Maximum Marks—40

Note :— Section A (1×8 marks) is compulsory. Section B (5×4 marks). Attempt any **5** questions. The answer should not exceed **two** pages. Section C (6×2 marks). Attempt any **2** questions. The answer should not exceed **five** pages.

SECTION—A

(Compulsory)

Write a brief account of the following :

1. Properties of T independent antigens
2. Markers on T cells attained in the thymus
3. Principle of Radial immunodiffusion
4. Direct agglutination test of bacteria
5. How body responds to extracellular bacteria ?
6. Immune invasion
7. Freunds complete adjuvant composition
8. Attenuation

SECTION—B

1. Describe the differentiating markers on mature T helper cells and their functions.
2. Give the structure of TCR.
3. Write down the procedure of rocket immunoelectrophoresis.
4. How to perform Haemagglutination inhibition reaction and its significance ?
5. How body responds to viruses ?
6. What do you understand by immune invasion ?
7. What are the merits and demerits of passive immunization ?
8. Which methods are adopted to prepare whole organism vaccines ?

SECTION—C

1. How T cells recognize exogenous and endogenous antigens ?
2. Write down the procedure for sandwich ELISA.
3. Give an account of immunopathological consequences of parasitic infections like malaria and babesia.
4. How to make purified macromolecules vaccines ?

Exam. Code : 107404
Subject Code : 2306

B.Sc. (Bio-Technology) 4th Semester

MOLECULAR BIOLOGY

Paper—BT-6

Time Allowed—3 Hours] [Maximum Marks—40

Note :– Attempt **all** the questions of Section A, **five** questions from Section B and **two** questions from Section C.

SECTION—A

Explain the following briefly :

1. Selfish DNA
2. Replicon
3. RNA primers
4. Conservative model of DNA replication
5. Major groove of DNA
6. Z form of DNA
7. C form of DNA
8. Episome. 1×8=8

SECTION—B

1. Give various steps of the translation initiation in prokaryotes.

2. Draw well labelled structure of the transcription bubble.
3. Give an experimental setup to demonstrate semiconservative mode of DNA replication.
4. Explain methylation and acetylation of histones.
5. Explain trp operon for control of tryptophan biosynthesis.
6. Explain Rolling-circle replication.
7. Describe eukaryotic transcription initiation mechanism.
8. Describe mechanism of translation termination in prokaryotes. 5×4=20

SECTION—C

1. Explain mechanism of chain elongation during protein synthesis.
2. Give mechanism of rho-dependent and rho-independent transcription termination in prokaryotes.
3. What are nucleosomes ? Describe its various components in detail.
4. Explain various insertion elements. What are uses of transposons ? 2×6=12

Exam. Code : 107404

Subject Code : 2307

B.Sc. (Bio-Technology) 4th Semester

AGRO AND INDUSTRIAL APPLICATIONS OF MICROBES-B

Paper-BT-7

Time Allowed—3 Hours] [Maximum Marks—40

Note :– Attempt **five** questions from Section–B and **two** questions from Section-C. Section-A is compulsory.

SECTION—A

1. Describe briefly :

   (i) Biopesticides

   (ii) Vermiculture

   (iii) Mycotoxins

   (iv) Biofertilizers

   (v) Mycorrhizal fungi

   (vi) Mycoherbicides

   (vii) Biochips

   (viii) Red Vs. white wine. 1×8=8

SECTION—B

2. How vermicomposting is different from traditional composting? Explain.

3. What is a surfactant? Describe the production of surfactants.

4. What are single cell proteins ? Describe the production of fungal SCP.

5. Describe the fermentative production of vitamin B12.

6. What is BT gene ? Describe the incorporation of BT gene in BT cotton.

7. Describe the plant and microbe interactions in biological nitrogen fixation.

8. Describe briefly the production technology of beer.

9. Describe the production of penicillin. 5×4=20

SECTION—C

10. Describe the microbes involved in the production of antibiotics and pharmaceutical drugs.

11. Discuss the fermentative production of organic acids.

12. Describe the large scale production of *Spirulina* as single cell proteins.

13. What are secondary metabolites ? Describe the production of a secondary metabolite by tissue culture techniuqe. 2×6=12

Exam. Code : 107404
Subject Code : 2309

B.Sc. (Biotechnology) 4th Semester

ENVIRONMENTAL STUDIES—II

Paper—ESL–222

Time Allowed—3 Hours] [Maximum Marks—50

Note :— Section A (15 Marks) : It consists of **FIVE** short answer type questions. Candidates are required to attempt any **THREE** questions, each question carrying **5** marks. Answer to any of the questions should not exceed **2** pages.

Section B (20 Marks) : It consists of **FOUR** essay type questions. Candidates are required to attempt **TWO** questions, each question carrying **10** marks. Answer to any of the questions should not exceed **4** pages.

Section C (15 Marks) : It consists of **TWO** questions. Candidates are required to attempt **ONE** question only which carries **15** marks. Answer to the question should not exceed **5** pages.

SECTION—A

1. Write about aesthetic and ethical values of biodiversity.
2. What is habitat loss ? How it can be stopped ?
3. How can the electronic waste be managed ?

4. What do you understand by term 'thermal pollution' ?
5. What are the control measures of urban and industrial solid waste ?

SECTION—B

6. What are nuclear hazards ? Mention a case study related to it.
7. Write a note on different measures adopted at national levels to conserve biodiversity.
8. Give a detailed account on Soil Pollution.
9. Write a note on relationship between environment and human health.

SECTION—C

10. Give a detailed account of various threats to biodiversity.
11. What is disaster management ? What is the role of an individual during any disaster ?

Exam. Code : 107406

Subject Code : 2331

B.Sc. (Bio-Technology) 6th Semester

APPLICATIONS OF PLANT TISSUE CULTURE

Paper—BT-2

Time Allowed—3 Hours] [Maximum Marks—40

Note :- (1) Attempt **ALL** parts from Section—A. Each question carries **1** mark. Answer to any part should not exceed **1/3** of a page.

(2) Attempt any **five** questions from Section—B. Each question carries **4** marks. Answer to any question to any part should not exceed **2** pages.

(3) Attempt any **two** questions from Section—C. Each question carries **6** marks. Answer to any question to any part should not exceed **5** pages.

SECTION—A

1. (i) Hardening

(ii) Somatic embryogenesis

(iii) Haploids

(iv) Embryo rescue

(v) Protoplast

(vi) Somatic hybrids

(vii) Cell suspension culture

(viii) Secondary metabolites.

SECTION—B

2. Stages of micropropagation.
3. Modes of regeneration.
4. Somatic embryogenesis vs organogenesis.
5. Ovule culture.
6. Factors affecting protoplast isolation.
7. Somatic hybrids vs cybrids.
8. Role of bioreactors in secondary metabolite production.
9. Discuss transgenic approaches in secondary metabolite production.

SECTION—C

10. What is micropropagation ? Describe various factors that affect micropropagation and the technical problems.
11. What is somaclonal variation ? Write down the factors that affect the production of somaclonal variants and its application.
12. What is somatic cell hybridization ? Write down the method of selection of heterokaryons and the application of somatic hybrids.
13. Discuss the production of secondary metabolites by tissue culture and their applications.

Exam. Code : 107406
Subject Code : 2332

B.Sc. (Bio Technology) 6th Semester

BT-3 : ANIMAL BIOTECHNOLOGY

Time Allowed—3 Hours] [Maximum Marks—40

Note :— Section A (1×8 marks) is compulsory. Section B (5×4 marks). Attempt any **5** questions. The answer should not exceed **two** pages. Section C (6×2 marks). Attempt any **2** questions. The answer should not exceed **five** pages.

SECTION—A

(Compulsory)

Write a brief account of the following :

1. Full form of BHK and B 16 cell line
2. Differentiation
3. Transfection
4. Transgenics
5. Monoclonal antibody
6. Marker on stem cells
7. How to cut the DNA at particular sites ?
8. Define regulatory protein.

SECTION—B

1. Which characteristic features of the cell line are studied and described while labeling it. Explain these features of WI-38 and 3 T3.
2. Which changes are brought in a cell after differentiation ?
3. How to perform Lipofaction ?
4. What are expression vectors ?
5. Materials used for microcarrier cultures and how to make them.
6. How embryonic stem cells are better than adult stem cells for culturing ?
7. Give the role of genetic engineering in production of vaccines.
8. How to raise transgenic cattle for milk production ?

SECTION—C

1. Define organ culture and cell culture. Describe the methods to raise organ cultures.
2. Describe the DEAE Dextran mediated and reteroviral infection method of transfection.
3. How to scale up anchorage dependent cultured cells ?
4. Write a note on Animal cloning and ethics involved in it. And also Embryo transfer technology.

Exam. Code : 107406
Subject Code : 2333

B.Sc. (Bio Technology) 6th Semester

INTELLECTUAL PROPERTY RIGHTS AND ENTREPRENEURSHIP

Paper — BT-4

Time Allowed—3 Hours] [Maximum Marks—40

Note :— Section **A** is compulsory. The candidates are required to attempt **five** questions from Section B and **two** questions from Section C.

SECTION–A
(1×8=8)

1. (a) What is A copyright ?

   (b) Give two examples of GI

   (c) What is the purpose of GATT ?

   (d) Highlight the importance of Uruguay Round of negotiations.

   (e) Discuss FDI in relation to trade

   (f) What is the major outcome of Budapest treaty ?

   (g) Define traits of an entrepreneur

   (h) What is project feasibility report ?

SECTION–B

(4×5=20)

2. What are patent claims ?
3. How IPR can promote business ?
4. What are the benefits and limitations of trade secret ?
5. How TRIMs influence trade at global level ?
6. How dumping Effects local trade ?
7. Discuss Berne Convention
8. What is the advantage of PCT system ?
9. Discuss the role of entrepreneurs in boosting economy.

SECTION–C

(6×2=12)

10. What are the major functions of WTO ?
11. Discuss the major amendments of Indian Patent Law.
12. Explain the principle of Most favoured Nation and its implication.
13. Discuss various costs involved in starting a pharma company.

Exam. Code : 107406

Subject Code : 2334

B.Sc. (Bio-Technology) 6th Semester

BIOPROCESS ENGINEERING—B

Paper—BT-5

Time Allowed—3 Hours] [Maximum Marks—40

Note :– Attempt the questions as directed.

SECTION—A

Note :– Attempt **all** the questions. 1×8=8

1. Write short notes on the following in about **50** words :

   (i) CSTBR

   (ii) Batch

   (iii) Plug flow

   (iv) Fed batch

   (v) D.O. Probe

   (vi) DSP

   (vii) Slug

   (viii) Effluent.

SECTION—B

Note :– Attempt any **five** questions. 5×4=20

2. Discuss the CSTBR.
3. Discuss the air loop bioreactor.
4. Explain the functioning of pH probe.
5. Explain the functioning of DO probe.
6. Discuss the agitation system.
7. Explain the down stream processing.
8. What is fermentation economics ? Discuss.
9. What is effluent treatment ? Discuss.

SECTION—C

Note :– Attempt any **two** questions. 2×6=12

10. Discuss the steady state kinetics of CSTBR.
11. Discuss the structure and functioning of galvanic DO probe.
12. Discuss the principle and procedure of super critical fluid extraction method for bio product recovery with an example.
13. Discuss the aerobic slug treatment process.

Exam. Code : 107406

Subject Code : 2335

B.Sc. (Bio-Technology) 6th Semester

BIOPHYSICAL AND BIOCHEMICAL TECHNIQUES—B

Paper—BT-6

Time Allowed—3 Hours] [Maximum Marks—40

SECTION—A

Note :– Attempt **All** questions. Each question carries **1** mark.

I. What is the role of matrix in MALDI ? What are the criteria for selection of matrix ?

II. What are the salient characters of fluors used in fluorescence spectroscopy ? Give two examples.

III. What is meant by electro-endosmosis and how it affects the separation of components during gel electrophoresis ?

IV. List different solubilizers used in PAGE and mention about their significance.

V. How capillary electrophoresis is different from gel electrophoresis ?

VI. Comment on nature of ampholytes and their role in electrophoresis.

VII. What is half life of a radioactive element ? Comment on its significance.

VIII. What is scintillation counting and how it is important in radioactivity studies ?

SECTION—B

Note :– Attempt **five** questions. Each question carries **4** marks.

I. What are the different types of TOF analysers ? Comment on merit and demerits of each.

II. How instrumental set up for a visible spectrophotometer and a spectrofluorometer differ ?

III. What are the different solubilizers used in electrophoresis ? Briefly discuss about their mechanism of action and give a suitable example.

IV. What is the principle of immuno-electrophoresis ? List different types and comment on their applications.

V. What is the working principle of capillary electrophoresis ? How it achieves separation of components ? Give a suitable example of application of this technique.

VI. What is meant by isoelectric point of a protein and how it could be determined ? Comment on its role in isoelectric focussing.

VII. How presence of radioactive materials can be detected ? Why proportional counters are preferred over other instruments for detecting radioactivity ?

VIII. Briefly explain components and working design of liquid scintillation system ? Support your answer with a suitable example.

SECTION—C

Note :– Attempt **two** questions. Each question carries **6** marks.

I. How amino acid sequence of a protein can be determined by mass spectrometry ? Explain with an illustrated flow chart of the protocol.

II. How poly-acrylamide (PA) gel is prepared ? List the components along with their significance in gel formation. How PA gels of different strength are prepared ?

III. Describe in detail the protocol and components to perform 2,D-electrophoresis ? Comment on its significance in proteomics ?

IV. (a) What is meant by rate of radioactive decay and what are units of radioactive decay ?

(b) What are the different modes of radioactive decay ? Give a suitable example of each.

29/5/18 (Eve)

Exam. Code : 107406
Subject Code : 2336

B.Sc. (Bio Technology) 6th Semester

PHYSICAL, ORGANIC & INORGANIC ASPECTS OF SPECTROSCOPY–B

Paper–BT-7

Time Allowed—3 Hours] [Maximum Marks—40

Note :– Attempt all questions of Section A and it is compulsory. Do any **five** questions from Section B and do any **two** questions from Section C.

SECTION–A

(Compulsory, do **all** questions)

1. Write three main requirements for observing ^1H NMR spectrum. 1
2. How many ^1H NMR signals are shown by the reference compound $Si(CH_3)_4$? 1
3. Depict ^1H NMR spectrum of ethyl bromide. 1
4. Name at least two solvents used for recording ^1H NMR spectrum of a compound. Give suitable reasons for your choice. 1
5. What is the major information we can get from the mass spectrum of a compound ? Explain with a suitable example. 1

6. From the mass spectrum of toluene, discuss three major ions you can identify. 1

7. Explain Nitrogen rule as used in mass spectrometry. 1

8. ^{79}Br and ^{81}Br have nearly equal abundance, then suggest various molecular ions obtained from Mass spectrum of methyl bromide. 1

SECTION–B

(Do any **five** questions)

9. Benzonitrile (C_6H_5CN) showed three major mass peaks at : m/z = 103 (100 %); 77(10 %) and 76(35 %) positions. Suggest which are possible species formed. The values in brackets are relative abundances of ions formed (Atomic masses : C = 12, H = 1; N = 14). 4

10. Ethylamine showed three major mass peaks at : m/z = 45(20 %); 21(21 %) and 30 (100 %) positions. Suggest which are possible species formed. The values in brackets are relative abundance of ions formed. 4

11. How metastable ions are generated ? What is their importance in mass spectrometry ? 4

12. Illustrate Mc Lafferty rearrangement using one example. 4

13. It is found that in proton NMR spectrum of a compound, there are only a small number of nuclei more in the ground state as compared to that in the excited state when NMR spectrum is recorded. How then this number is maintained and no saturation of the NMR system occurs ? Discuss relaxation phenomena which do this job. 4

14. Suppose ^1H NMR spectrum of compound **A** shows one triplet in intensity ratio (1 : 2 : 1) at ö = 2.5 ppm; one quartet of doublets in intensity ratio (1 : 3 : 3 : 1) at ö = 3.5 ppm and one triplet in intensity ratio (1 : 2 : 1) at ö = 5.5 ppm. Suggest structure of compound with suitable justification. 4

15. The OH proton NMR signal of p-nitrophenol undergoes shift to highfield when concentration of p-nitrophenol is decreased, while OH proton of o-nitrophenol did not change its position with concentration. Explain this behaviour of two compounds. 4

16. Predict ^1H NMR spectrum of ethyl acetate

$\{CH_3–C(=O)–O–CH_2–CH_3\}$ 4

SECTION–C

(Do any **two** questions)

17. Explain briefly : electron ionization (EI) and chemical ionization (CI) techniques used for formation of ions in mass spectrometry. 6

18. Give applications of mass spectrometry to :

(a) alcohols and

(b) aromatic compounds.

Describe main species and their relative abundance. 6

19. How will you distinguish the following three compounds using proton NMR spectroscopy ?

CH_3–OH; CH_3–C(=O)H and $(CH_3)_2C$=O 6

20. How proton NMR spectrum of a compound is recorded ? Give main components of a NMR spectrometer in the form of a sketch ? How CW and FT NMR techniques are different ? 6