C.No/5/BT-1 27-11-17 (EVE)

Exam. Code : 107405
Subject Code : 2288

B.Sc. (Biotechnology) 5th Semester

rDNA TECHNOLOGY—A

Paper—BT-1

Time Allowed—3 Hours] [Maximum Marks—40

SECTION—A

Attempt **ALL** questions — **1** mark each :—

1. How the T4DNA ligase join the DNA fragments ?
2. Why we do poly A tailing of DNA/RNA ?
3. What will be ideal size range of cloning vector; 4-8 kb, 10-15 kb or more than 15 kb.
4. What is the difference between Plasmids and Phagemids ?
5. How can you hybridize DNA with RNA ?
6. Micropojectiles can be used to transform bacteria. True or false ?
7. Name the enzyme used for end labelling of probe.
8. Explain transfection.

SECTION—B

Attempt **FIVE** questions by selecting **ONE** from each unit. **4** marks each.

UNIT—I

1. What are kinases and phosphatases ? Explain their role in cloning of a gene with help of example.
2. What are endonucleases and restriction enzyme ? Differentiate between Restriction enzyme I, II and III.

UNIT—II

3. Write the essential features of a cloning vector. What are the basic differences between pUC and pBR 322 vectors ?
4. Write in detail about different type of vectors based on lambda and how these vectors are used for cloning experiments.

UNIT—III

5. Explain southern blotting.
6. Explain chemical and electrical based method of transformation.

UNIT—IV

7. Write short notes on :—
   (a) Radioactive labeling of DNA
   (b) Nick translation.

8. What is random priming sequencing ? With the help of diagram explain the procedure for random sequencing in detail.

SECTION—C

Do any **TWO** questions — **6** marks each.

1. Explain the mechanism of Alkaline phosphatases, terminal transferase and ligases. Mention, how these enzymes help in cloning of genes ?
2. What purpose do selectable markers serve in vector ? What are the functional components found in these three different vectors : plasmid, cosmid and YACs ? What size fragment would you insert into each ?
3. Explain Southern blotting. What kind of membrane you will prefer for this method and why ?
4. Explain non-radioactive methods of DNA labelling.

C-M0-3, 1-12-17 (E&E)

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B.Sc. Biotechnology 5th Semester

CONCEPTS 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.

(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) Aseptic culture

(ii) Carbon source in plant tissue culture

(iii) Role of gibberellins

(iv) Physiological role of abscisic acid

(v) Totipotency

(vi) Callus

(vii) Gene gun

(viii) Reporter gene.

SECTION–B

2. Role of micronutrients in tissue culture medium.
3. Mention various steps to prepare plant tissue culture medium.
4. Describe the physiological function of cytokinins.
5. Justify the plant growth regulators are important in plant tissue culture medium.
6. What is plant-explant-plant concept ?
7. Discuss various factors that affect cellular totipotency.
8. Mention various extrinsic factors that influence plant tissue culture.
9. Agrobactrium mediated gene transfer.

SECTION–C

10. Mention macronutrients and micronutrients and their deficiency symptoms in plants.
11. Write down the physiological functions and biosynthesis of auxin.
12. Discuss various factors that affect plant tissue culture.
13. Describe various methods of gene transfer.

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B.Sc. (Biotechnology) 5th Semester

ANIMAL TISSUE CULTURE

Paper—BT-3

Time Allowed—3 Hours] [Maximum Marks—40

Note :—ALL the questions in Section A are compulsory (maximum length ½ page). Attempt any **FIVE** questions from Section B (maximum length **2** pages) and **TWO** questions from Section C (maximum length **5** pages).

SECTION—A (Marks : 1×8=8)

1. Write a short note on essential media.
2. Describe briefly the P3 facility.
3. What is the chemical composition of DMEM media ?
4. Which microscope is required in ATC ?
5. Write a note on suspension type cell culture.
6. How phases of cell cycle are determined ?
7. Which are the major contaminants in ATC lab. ?
8. Why CO_2 incubator is used in ATC ?

SECTION—B (Marks : 4×5=20)

1. Mention any two methods to preserve cultures of microbes.
2. Define medium. What is the role of yeast extract and agar in the medium ?
3. Write a note on carbon, nitrogen and energy requirement of bacteria.
4. Define sterilization. Explain the use of moist heat to control micro-organisms.
5. Briefly describe the characteristics of an ideal antimicrobial chemical agent.
6. What do you understand by radiation sterilization ? Give mechanism and one example.
7. What is batch culture ?
8. Mention all the constituents present in serum.

SECTION—C (Marks : 6×2=12)

1. Describe in detail the P1 facility. How it differs from P4 facility ?
2. With well labeled diagrams, give a layout of ATC lab.
3. Mention in detail the protocols for setting primary cell culture and established cell line culture. Mention three applications of each.
4. Write a detailed note on different types of cell culture media used in ATC and their physiochemical properties.

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B.Sc. Biotechnology 5th Semester

PATENT LAWS IN BIOTECHNOLOGY

Paper—BT-4

Time Allowed—3 Hours] [Maximum Marks—40

Note :— Section A : **ALL** questions are compulsory. Each question carries **1** mark. (1×8=8)

Section B : Attempt any **five** questions. Each question carries **4** marks. (4×5=20)

Section C : Attempt any **two** questions. Each question carries **6** marks. (6×2=12)

SECTION—A

1. What is the role of Review Committee on Genetic Manipulation (RCGM) ?
2. Where are the Indian patent offices located and which city has the headquarter ?
3. Are microorganisms patentable in India ?
4. Though the information about the SNP's discovered by the non profitable consortium is made freely available why does it plan to patent all the SNP's ?

5. What is the life of patent ? What happens after its expiry ?

6. Where do we need to deposit microorganisms and why ?

7. What do you mean by infringement of patent ?

8. How are patent Cooperation treaties useful ?

SECTION—B

1. Discuss the ethical issues related to patenting in Biotechnology.

2. Write a note on principles of TRIPS agreement. How it protects plant breeder's right ?

3. Who is a patentee ? What are his rights ?

4. Explain which kinds of inventions are patentable and nonpatentable in India.

5. Write a note on provisional and complete specifications.

6. What are main elements of patent application and how does it differ from a research article ?

7. Explain different sources for retrieving the patent information.

8. What are TRADE MARKS ? Name three well known TRADE MARKS and the products with which these are associated ?

SECTION—C

1. Explain first Indian patent law and its amendments.

2. Write a note on risk associated with release of genetically modified microorganisms with reference to Biosafety, Ecological impact and Environment concern.

3. What is Intellectual Property Rights ? Explain types of IPR and how these are protected.

4. Discuss briefly the status of patents related to medicinal plants.

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Subject Code : 2292

B.Sc. Biotechnology 5th Semester

BIOPROCESS ENGINEERING–A

Paper–BT–5

Time Allowed—3 Hours] [Maximum Marks—40

SECTION–A

(All questions are compulsory.)

1. Define and explain the following :
   (i) Feb batch
   (ii) Continuous culture
   (iii) Productivity
   (iv) Biomass
   (v) Product
   (vi) Inducer
   (vii) Fermenter
   (viii) Sterilization. 1×8=8

SECTION–B

(Attempt any **four** questions)

2. Discuss the sterilization cycle.
3. Discuss the depth filter.

4. Diagrammatically explain the internal feedback bioreactor.
5. Diagrammatically explain the external feedback bioreactor.
6. Discuss the growth kinetics.
7. Correlate the doubling time with specific growth rate.
8. Discuss the factors affecting oxygen transfer in bioreactors.
9. Discuss the KLa. 5×4=20

SECTION–C

(Attempt any **two** questions)

10. Discuss the kinetics of media sterilization.
11. Discuss the kinetics and effect of inducer on product synthesis.
12. How will you experimentally determine the maximum specific growth rate and saturation constant ? Discuss.
13. Discuss the kinetics of fed batch bioreactors. 6×2=12

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Subject Code : 2293

B.Sc. (Biotechnology) 5th Semester

BIOPHYSICAL AND BIOCHEMICAL TECHNIQUES—A

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. Partition Co-efficient.
2. Swinging-bucket rotor.
3. Sedimentation Co-efficient.
4. Ammonium sulphate precipitation.
5. Retention time.
6. Molar Extinction co-efficient
7. Transmittance.
8. Specific activity.

1×8=8

SECTION—B

1. Discuss briefly different types of rotors of a centrifugation machine.

2. What is analytical centrifugation ? Explain its theory and applications.
3. What is gel-exclusion chromatography ? Explain its applications.
4. Differentiate between ion-exchange and affinity chromatography.
5. What is gas liquid chromatography ? Give its applications.
6. Discuss briefly that how fast protein liquid chromatography is helpful in the purification of proteins.
7. What is Lambert-Beer's Law ?
8. Write a note on double beam spectroscopy.

4×5=20

SECTION—C

1. Define centrifugation. Describe the differential and density gradient centrifugation.
2. Discuss the principle and applications of paper and thin layer chromatography.
3. Discuss the principle and applications of HPLC.
4. What is spectroscopy ? Discuss visible spectroscopy.

6×2=12

(18/12 EVR)

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Subject Code : 2294

B.Sc. (Biotechnology) 5th Semester

PHYSICAL, ORGANIC & INORGANIC ASPECTS OF SPECTROSCOPY—A

Paper—BT-7

Time Allowed—3 Hours] [Maximum Marks—40

SECTION—A

Note :— **ALL** questions in this section are compulsory and each question is of **1** mark.

1. Arrange the following radiations in increasing order of wavelengths : UV, X-rays, Radiowaves, Microwaves Visible rays.
2. Convert the following wavelengths to their wave numbers (cm^{-1}) :

   90 MHz, 2.5 microns.
3. For the detection of aldehydes and ketones, which transition is more authentic π to π^* or n to π^* ?
4. Which spin state is observed at the instant of excitation ?
5. Write the expected infrared peaks for the following compounds :

   Acetic anhydride, Benzamide.
6. How many fundamental vibrational frequencies can be observed in the infrared absorption spectrum of water ?

7. Why do carbon-carbon double bonds and carbonyl bonds absorb at different frequencies ?

8. Describe hypso-chromic effect with an example.

SECTION—B

Note :— Attempt any **FIVE** questions from this Section. Each question is of **4** marks.

9. What is fluorescence ? How it is different from phosphorescence ?

10. State Born-Oppenheimer approximation.

11. The ultraviolet spectrum of benzonitrile shows a primary absorption band at 224 nm and a secondary band at 271 nm.

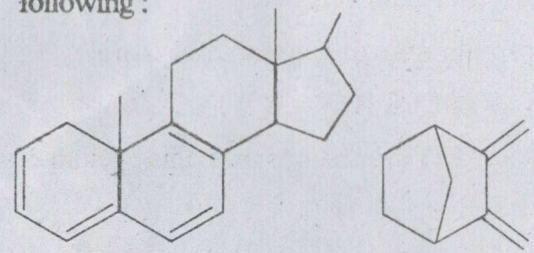
    If a solution of benzonitrile in water, with a concentration of 1×10^{-4} molar, is examined at a wavelength of 224 nm, the absorbance determined is 1.30. The cell length is 1 cm, what is the molar absorptivity of this absorption band ?

12. The UV spectrum of acetone shows absorption maximum at 166, 189 and 279 nm. What type of transition is responsible for each of these bands ?

13. Methyl alcohol is a good solvent for the determination of UV spectrum; however it is not a good solvent for infra-red spectroscopy, why ?

14. How many fundamental vibrational frequencies would you expect to observe in the IR spectrum of CO_2 ?

15. Using Woodward Fieser rules to calculate the λ_{max} for the following :



(i) (ii)

16. Describe the following :
    (a) Bathochromic shift
    (b) Hypsochromic shift.

SECTION—C

Note :— Attempt any **TWO** questions from this Section. Each question is of **6** marks.

17. What is Frank Condon principle ? What are its applications and limitations ?

18. What is Beer Lambert's Law ? What are its applications and limitations ? Can this law be applied to a concentrated solution ?

19. Define Infra-red spectroscopy. Describe various types of fundamental vibrational frequencies. Explain the factors that influence vibrational frequencies.

20. What is a Chromophore ? Also explain the term auxochrome. How will you explain the effect of conjugation on the absorption maximum of polyenes ?