

Time : 3 Hours]

All questions carry equal marks

Q.1 Answer the following (any Two) 14

- (a) Explain the measurement and control of flow and pressure in a fermenter.
- (b) Discuss the factors affecting K_{La} and write a note on its determination.
- (c) Write a note on heat transfer.
- (d) Describe the design of a Batch fermenter having impellers.

Q.2 Answer the following (any Two) 14

- (a) What is a Biosensor? Discuss the types and significance of biosensors used in fermentor.
- (b) Discuss the PID control used in fermenters.
- (c) Write a note on monitoring and foam control with suitable examples.
- (d) Discuss the role of computer applications in fermentation technology.

Q.3 Answer the following (Any Two) 14

- (a) What is pairwise Sequence alignment? Discuss in detail about various types and methods behind them.
- (b) What are Word (k-tuple) methods? Explain in detail with the relevant examples.
- (c) What are HMMs? Write its advantages and disadvantages. Name and discuss briefly about all the major databases working on this algorithm showing their significance in protein domain analysis.
- (d) What is molecular clock and explain its association with phylogenetic analysis studies? Discuss tree terminologies in detail with diagrammatic representations.

(17/0)

Q.4 Answer the following(Any Two)

14

- (a) Explain in detail the Transcriptome analysis by two major approaches. Give names and brief description of their respective tools.
- (b) Discuss in detail “The Human Genome Project” with the diagrammatic representation wherever required.
- (c) What is structural genomics and what are three different modeling based methods used in this study? What is comparative genomics and discuss briefly about the online tools of the same.
- (d) Define Rational drug design. Describe in detail about various types of Rational drug design. Give four examples of Drugs developed by RDD.

Q.5 Answer the following(Any Seven)

14

- (a) Thermistors.
- (b) Deflection analysers
- (c) Enzyme Biosensor
- (d) Components of a control loop
- (e) Genebank
- (f) SWISS PROT
- (g) NGS
- (h) SNP

M.Sc. (Sem.-II) Examination

407

Bio Technology (Inte.)

May-2017

[Max. Marks : 70]

Time : 3 Hours]

Q-1 Answer the following (Any Two)

14

- A. Explain variance and Standard Deviation. New anti-cancer drug showed percentage improvement level in patients to 31, 32, 46, 27, 38, 39, 44, 41, 43 and 53. Find the Standard Deviation.
- B. List various non-parametric statistical tests and explain any one
- C. Define Central Tendency and its types. Measure central tendency from the data on incidence of epidemic in 8 districts

Frequency of Incidence	01-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80
Frequency	2	4	3	5	12	14	5	7

- D. Describe F test and its objective. Perform two sample F-test for the data on improvement in symptoms in number of patients given test drug-A and test drug-B

Drug-A	10, 12, 14, 10, 13
Drug-B	3, 7, 15, 16, 19, 6, 5

Q-2 Answer the following (Any Two)

14

- A. Describe use of digital imaging in the field of medicine and diagnostics.
- B. Explain how object are recognized in computer image analysis
- C. Discuss application area of Digital Image analysis in scientific research
- D. List Image Analysis software and describe features and uses of TL-100

Q-3 Answer the following (Any Two)

14

- A. Explain in computer methods for constructing phylogenetic tree.
- B. Explain importance of sequence alignment and discuss method for multiple sequence alignment
- C. Describe bioinformatics approaches for novel drug design and discovery
- D. Write Perl code for (1) generating complimentary sequence (2) Transcribed sequence and (3) concatenated sequence from steps (1) and (2) for input: 'ATGTGACGTAGCAAG'

Q-4 Answer the following (Any Two)

14

- A. Discuss properties of material that makes it suitable for use as nanomaterial
- B. Explain principle and application of Atomic Force Microscope
- C. Describe x-ray diffraction as important tool for biochemical analysis
- D. Describe use of nanotechnology in drug delivery and Cancer treatment

Q-5 Answer the following

14

- Write SciLab syntax for: (1) Making a (2*3) matrix (2) displaying the word 'hello'.
- What is the purpose of docking?
- What is P value?
- Define regression coefficient
- How to convert AGCTAGCT in to lower case in Perl?
- List four identifiers used in Perl
- What is probability for isolated single cell being transformant, from a culture mixture of wild type : Recombinant cells in ratio of 10:1000?
- Give use of OCR technique
- What is QSAR?
- How nano-sensor works?
- Give use of Surface Plasmon Resonance
- How proteins can be engineered through nanotechnology?
- When is Chi-test performed?
- Differentiate between Binomial and Poisson distributions

M.Sc. (Sem.-II) Examination

408

Bio Technology (Inte.)

May-2017

Time : 3 Hours]

[Max. Marks : 70

BTI-408 Genetic Engineering

Ques 1 Answer any two of the following [14]

- [A] "Genetic organization of bacteriophage λ favours its subjugation as vector" - Justify.
- [B] Define Cosmid and explain the construction of genomic library as an application of Cosmid cloning scheme.
- [C] Discuss different methods used for the screening of genomic library.
- [D] "Adaptors and Linkers are short double stranded DNA molecules that permit different cleavage sites to be incorporated"-Explain

Ques 2 Answer any two of the following [14]

- [A] Describe the components and steps occurring during the DNA uptake in Gram-Positive Bacteria.
- [B] Define Competence and explain the process of natural competence.
- [C] Discuss mans for genetic engineering of fungi with emphasis on parasexual cycle.
- [D] Discuss the process of microinjection and differentiate it with the macroinjection.

Ques 3 Answer any two of the following [14]

- [A] Describe the different types of Polymerase Chain Reaction with suitable examples.
- [B] Discuss the applications of Homologous and Heterologous probes.
- [C] Write a short note on "Shotgun Sequencing".
- [D] Explain the Southern Blotting techniques and give their applications.

Ques 4 Answer any two of the following [14]

- [A] Describe the Industrial Applications of rDNA technology.
- [B] Discuss the role of Ti-Plasmid in the development of Transgenic plant.
- [C] "Egg as Bioreactor" – Comment.
- [D] Explain the applications of genetic engineering in the field of Health and Hygiene.

Ques 5 Answer in brief [14]

1. What is Biolistics?
2. Define Protoplast transformation.
3. Define Transfection.
4. What is BAC and PAC?
5. Write any two properties of Adenoviruses as a suitable Vector.
6. Give any two applications of T4 DNA ligases.
7. Define Yeast integrative plasmid.
8. Give the application of Electroporation technique in genetics.
9. Define Oligonucleotides.
10. What is reporter gene? Give examples.
11. Enlist Clonal selection methods.
12. Write any two applications of genetic engineering in fungal research.
13. What is a transgenic animal?
14. Give any two reasons why a cloned gene might not be expressed in a host cell.

Time : 3 Hours]

- Q.1. Write answers to **any two** of the following questions. 14
- (A) Give an overview on various carbon sources used in media formulation at industrial scale microbial processes.
 - (B) Discuss techniques used for preservation of industrial strains with their advantages and disadvantages.
 - (C) Describe various strategies used for screening for novel microbial products.
 - (D) Enlist ideal characteristics of an industrial strain. Discuss methods used for strain improvement.
- Q.2. Describe in detail **any two** of the following questions. 14
- (A) Technique of batch sterilization of media by steam used in industrial processes with its pros and cons.
 - (B) Inoculum development program and its significance with special reference to bacterial culture.
 - (C) Methods for determination of aeration capacity with their limitations.
 - (D) Non-Newtonian fluids and their role in mixing in fermentation process.
- Q.3. Answer the following questions (**any two**) 14
- (A) Give comparative account on mechanical and non-mechanical methods of cell disintegration.
 - (B) Describe mechanical methods for separation of microbial cells. Write its advantages and limitations.
 - (C) What is downstream process? Write the major steps involved in downstream process with their significant aspects.
 - (D) Discuss with flow chart downstream process for obtaining a pure antibiotic with any suitable example.
- Q.4. Write answers to **any two** of the following questions 14
- (A) What is scale-up? Write main aims of scale-up with reference to media sterilization and give the problems encountered in achieving the aims.
 - (B) Describe scale-up of yeast inoculum for industrial fermentation.
 - (C) Narrate dynamic method at constant K_{La} in terms of aeration scale-up.
 - (D) Discuss how the monitoring experiment is useful to find out the problems that occur during scale-up.
- Q.5. Answer very briefly (**any seven**) 14
- (A) Solid-liquid extraction
 - (B) Difference between pitching and cropping
 - (C) Molecular sieves
 - (D) Major limitation of strain improvement
 - (E) Corn-steep liquor
 - (F) Stages of continuous steam sterilization
 - (G) Mixed culture
 - (H) Stages of scale-up
 - (I) Depth filter

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M.Sc. (Sem.-II) Examination

410

Bio Technology

May-2017

Time : 3 Hours]

[Max. Marks : 70

Instruction: All the questions carries equal marks.

Q – 1 Answer **any two** of the followings. (14)

- (a) Describe production process of citric acid.
- (b) Write a note on production of bioethanol using yeast.
- (c) Write on microbial production of acetic acid.
- (d) Differentiate between Beer and Wine and explain steps of Wine production.

Q – 2 Attempt **any two** of the followings. (14)

- (a) What is nanotechnology? Explain applications of nanobiotechnology.
- (b) What is siderophores? Explain importance of siderophores.
- (c) Describe microbial production of cephalosporins.
- (d) Write a note on future vaccines.

Q – 3 Answer **any two** of the followings. (14)

- (a) Describe microbial production of protease and its applications.
- (b) Give a list of vitamin B and explain fermentative production of vitamin B2.
- (c) Discuss microbial production of amylases and its applications.
- (d) Describe tryptophan producing bacteria and production process of tryptophan.

Q – 4 Attempt **any two** of the followings. (14)

- (a) What are steroid? Describe microbial transformation of any one steroid.
- (b) Describe the microbial production and uses of PHB.
- (c) What is biosurfactant? Explain microbial production of biosurfactants.
- (d) Describe the microbial production and uses of Ergot alkaloids.

Q – 5 Write in short on **any seven** of the followings. (14)

- (i) Describe the microorganisms used in production of streptomycin.
 - (ii) Write on advantages of killed vaccines.
 - (iii) Name the key enzymes involved in the production of lysine.
 - (iv) Give the applications of acetic acid.
 - (v) Describe microorganisms used in production of streptomycin.
 - (vi) Write on importance of 'hops' in Beer production.
 - (vii) Write the importance of vitamin B12.
 - (viii) Write on lipase producing microorganisms.
 - (ix) Write on xanthan producing microorganisms.
 - (x) Enlist anticancer agents.
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