CENTRAL UNIVERSITY OF HARYANA
End Semester Examinations April 2022

Programme: M.Sc. Biotechnology | **Session: 2021-22**
Semester: First | **Max. Time: 3 Hours**
Course Title: Genetics | **Max. Marks: 70**
Course Code: SIAS BT 1 1 04 C 4004

Instructions:

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks.

1. **(4X3.5=14)**

a). In sweet peas, the synthesis of purple anthocyanin pigment in the petals is controlled by two genes, B and D. The pathway is

(i) What color petals would you expect in a pure breeding plant unable to catalyze the first reaction? (ii) What color petals would you expect in a pure breeding plant unable to catalyze the second reaction? (iii) If the plants in parts a and b are crossed, what color petals will the F1 plants have? (iv) What ratio of purple : blue : white plants would you expect in the F2?

b) What is the difference between codominance and incomplete dominance?

c) Explain what is Hardy Weinberg equilibrium? What is its significance?

d) Recombinant frequencies for different linked genes range from 0 to 50 percent, depending on their closeness. Is this statement true or false? Explain your answer with the help of suitable diagram.

e) Explain following different types of mutations: translocation, inversion, regulatory mutations. What is the evolutionary significance of mutations?

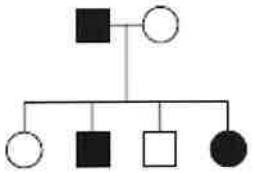
f) How can transformation and conjugation be used for mapping recombination frequencies in prokaryotes? Explain.

g) Explain the function of cI repressor in regulation of lytic-lysogeny switch of phage lambda.

2. **(2X7=14)**

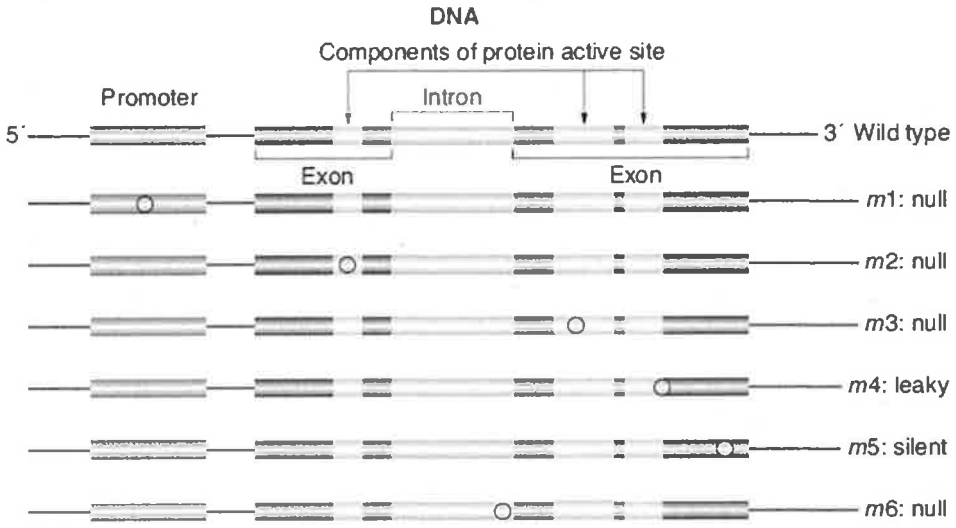
a) Describe maternal inheritance. How can you test maternal inheritance? What is the difference between penetrance and expressivity?

b) (i) In the pedigree below, the black symbols represent individuals with a very rare blood disease. If you had no other information to go on, would you think it more likely that the disease was dominant or recessive? Give your reasons.



(ii) If a man of blood-group AB marries a woman of blood group A whose father was of blood-group O, to what different blood groups can this man and woman expect their children to belong? Explain with reason.

c) Study the figure given below. The circles represent the sites of mutations in a protein. Why do mutations at different sites result in null, leaky, and silent mutant phenotypes? Give the most plausible explanation for mutants m1 to m6. Is it likely for any of these mutations to exhibit completmentation? State yes or no, with a logical explanation.



3. **(2X7=14)**

a) In a randomly mating laboratory population of Drosophila, 4 percent of the flies have black bodies (encoded by the autosomal recessive b), and 96 percent have brown bodies (the wild type, encoded by B). If this population is assumed to be in Hardy–Weinberg equilibrium, what are the allele frequencies of B and b and the genotypic frequencies of B/B and B/b?

b) You have a Drosophila line that is homozygous for autosomal recessive alleles a, b, and c, linked in that order. You cross females of this line with males homozygous for the corresponding wild-type alleles. You then cross the F1 heterozygous males with their heterozygous sisters. You obtain the following F2 phenotypes (where letters denote recessive phenotypes and pluses denote wild-type phenotypes): 1364 + + +, 365 a b c, 87 a b +, 84 + + c, 47 a + +, 44 + b c, 5 a + c, and 4 + b +.

What is the recombinant frequency between a and b? Between b and c? (Remember, there is no crossing over in Drosophila males.). What is the coefficient of coincidence?

c) What is the difference between genetic and physical maps? Explain any three different types of molecular markers.

4. **(2X7=14)**

a) How do ionizing radiations cause mutations? Name any one mutagen that causes;

(i) incorporation of base analogs (ii) specific mispairing (iii) intercalation (iv) base damage

b) What is meant by C-value paradox? Explain in detail. Differentiate between autopolyploidy and allopolyploidy with suitable examples?

c) What is aneuploidy? List three human disorders arising due to aneuploidy and briefly explain the genetic cause of these disorders.

5. **(2X7=14)**

a) Describe positive and negative regulation and explain how lac operon is regulated negatively and positively?

b) Describe polytene and lampbrush chromosomes. Explain what is meant by epigenetic inheritance.

c) The broad bean (*Vicia faba*) is diploid and 2n = 18. Each haploid chromosome set contains approximately 4 m of DNA. The average size of each chromosome during metaphase of mitosis is 13 μm. What is the average packing ratio of DNA at metaphase? (Packing ratio = length of chromosome/length of DNA molecule therein.) How is this packing achieved? Explain in detail.

CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations April 2022

Programme: M.Sc. Biotechnology **Session: 2021-22**

Semester: First **Max. Time: 3 Hours**

Course Title: Principles of Biotechnology **Max. Marks: 70**

Course Code: SIAS BT 1 1 01 GEC 4004

Instructions:

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and students need to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) What is recombinant DNA technology?

b) How genes can be transferred in plants?

c) What do you mean by Nanomedicines?

d) What is the role of Gene therapy in treating human diseases?

e) How biotechnology is playing role in vaccine development, explain with example.

f) Biotechnology is important in solving pollution related problems. Explain with suitable examples.

g) What is copyrights and how it is different from Trademark?

Q 2. (2X7=14)

a) What is Gene Cloning? Explain with example.

b) "Roles of microbes in Industry and agriculture sector are enormous". How you can substantiate this statement.

c) What roles biotechnology may play in production of Metabolites? Explain with examples.

Q3. (2X7=14)

a) What do mean by "Plant tissue culture". What are basic components of this technique along with various applications?

b) How a transgenic plant can be produced. What are the various uses & drawbacks of such plants?

c) "Genome edited animals are same as cloned animals". Give your comments about it.

Q 4. (2X7=14)

a) 'Biotechnology has a major role to play in the Forensic science'. Justify this statement.

b) How can nanomedicine may revolutionize the field of drug delivery? Explain with suitable examples.

c) What roles biotechnology is playing in energy management and restoration of degraded lands?

Q 5. (2X7=14)

a) What are the ethical issues related with nanotechnology. What are the various impacts of nanotechnology on the human society?

b) What are the major types of Intellectual Property Rights (IPRs). Explain each with suitable examples.

c) Explain any two inventions in the field of Nano Technology with special reference to the Agriculture Sector.

CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations April 2022

Programme: M.Sc Biotechnology **Session: 2021-22**

Semester: First **Max. Time: 3 Hours**

Course Title: Analytical Techniques **Max. Marks: 70**

Course Code: SIAS BT 1 1 05 C 4004

Instructions:

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and students need to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) What is partition coefficient? Write its role in the analysis of mixture.

b) What is light scattering? Differentiate forward and backward scattering.

c) Write short note on pulse field gel electrophoresis.

d) Ram purified a metabolite from bacterial culture. Suggest any one technique to check the homogeneity of the metabolite.

e) Write Abbe´ equation for determining resolution power of a lens.

f) What is Yeast-3-hybrid (Y3H) system?

g) Explain working of a confocal microscope along with its uses.

Q 2. (2X7=14)

a) What is electron microscopy? Describe principle and working of different types of electron microscope.

b) What do you mean by differential staining? What are the various fixation techniques being used in studying microorganisms.

c) Describe structure and function of a phase-contrast microscope. How it is different from compound microscope?

Q3. (2X7=14)

a) Write functions of SDS, ammonium persulfate, stacking & resolving gel, bisacylamide, bromophenol blue, dithiothretol and beta mercaptoethanol in polyacrylamide gel electrophoresis.

b) Mohan homogenized rat liver tissue in laboratory. Explain the technique that can be used to separate different cellular components of the homogenate.

c) What is 2-D gel electrophoresis? How this techniques can be used to study the effect of salt stress on protein synthesis.

Q 4. (2X7=14)

a) What is the principle of gel filtration chromatography? How this technique can be used to study the oligomeric nature of proteins.

b) Explain different types of ion exchange chromatography. How it is different from hydrophobic interaction chromatography.

c) Describe the principle, organization and applications of HPLC or FPLC system.

Q 5. (2X7=14)

a) Explain in details the working & uses of Phage display technique.

b) What do you understand by NMR spectroscopy? Explain in details the principle, and uses of NMR spectroscopy.

c) Explain principle and functioning of MALDI and Electrospray Ionization (ESI) techniques?

CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations April 2022

Programme: M.Sc. Biotechnology **Session: 2021-22**

Semester: First **Max. Time: 2 Hours**

Course Title: Introduction to Biotechnology **Max. Marks: 35**

Course Code: SIAS BT 1 1 01 C2002

Instructions:

1. Question no. 1 has four parts and students need to answer any two. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries three and half marks.

Q 1. (2X3.5=7)

a) What are the major difference in old and new biotechnology?

b) Describe red, green, blue and grey biotechnology with two examples in each?

c) What is vector? Enumerate it various types?

d) What is pBR322? Write at least 3 features of it.

Q 2. (2X3.5=7)

a) Describe four methods for detection of genetic disease.

b) Enumerate 10 human diseases for which genetic test is available.

c) How artificial intelligence can be used in animal dairy farming?

Q3. (2X3.5=7)

a) What is bio economy? How it is different than circular bio economy? What is the target and vision of India in bio economy?

b) What is nanotechnology? Describe nano-scale effect on its properties.

c) Describe four applications of nano technology in diagnostics?

Q 4. (2X3.5=7)

a) What is Paris Agreement? How biotechnology can help in environmental monitoring?

b) Describe applications of crop biotechnology?

c) Why herbicide tolerant crop is needed?

Q 5. (2X3.5=7)

a) Describe four applications of recombinant DNA technology?

b) Describe the major steps in recombinant DNA technology?

c) Describe societal and ethical issues in biotechnology.

Central University of Haryana

End Semester Examinations April, 2022

Programmes: M.Sc. Biotechnology **Session: 2021-22**
Semester: First **Max. Time: 3 h**
Course Title: Introduction to Microbiology **Max. Marks: 70**
Course Code: SIAS BT 1 1 02 C 4004

Instructions: Question no. 1 has seven parts and students need to answer any four. Each part carries equal (3.5) marks. Question no. 2 to 5 have three parts and students need to answer any two parts of each question. Each question carries seven marks.

Q.1. Answer the following questions 3.5x4=14

i. Write short note on phycobillisome.
ii. Mohan took two flasks containing LB medium. He kept both flasks at 30 °C for 24 h and observed microbial growth in one flask only. Discuss the reason behind this observation.
iii. Differentiate between prions and virions.
iv. Draw well labelled diagram of a bacterial cell.
v. Briefly explain the role of basidiomycetes in bioremediation.
vi. Write short note on subunit vaccines with examples.
vii. Briefly explain the role of fungi as food with examples.

Q.2. a) Explain the differential staining of microorganisms. How it is differ from negative staining. 7

b) Explain the contributions of Alexander Fleming, Antonie van Leeuwenhoek and Robert Koch 7

c) You have been given a soil sample. Explain a suitable process for the enumeration of bacteria in the given soil sample with diagram. 7

Q.3. a) How archaea were identified. Explain the organization of cell wall in different archaea with diagram 7

b) Write short note on i) Binomial nomenclature of microbes, ii) Lytic cycle in bacteriophage. 7

c) What is microbial taxonomy? How will you identify a bacterial cell isolated from soil sample using any three parameters? 7

Q.4. a) Explain salient features of (Any two) i) Moulds, ii) Protozoa and iii) Red algae 7

b) *Bacillus subtilis* was grown in LB broth for 72 hours at 37 °C and 200 rpm under batch fermentation. Explain with diagram the growth profile of the bacterial culture under these conditions. 7

c) How pH, temperature and oxygen play an important role in the classification of microorganisms? 7

Q.5. a) Explain the roles of microorganisms in improving the availability of environmental nitrogen and phosphorus for the growth and development of crops. 7

b) Write short note on (Any two) i) Vaccines, ii) Fermented foods and iii) Biopesticides. 7

c) Write short note on super bug and microbial hydolases. 7