



**ARKAJAIN**  
**University**  
Jharkhand

**6<sup>th</sup> Semester End Term Examination: 2021-22.**

**Subject** : Bio Analytical Tools **Roll No:** .....

**Course** : B. Sc. Biotechnology

**Full Marks** : 60 **Time** : 3 Hours.

**Instructions to the Candidates:**

- Read the question paper very carefully.
- Start writing from 2nd page onwards; Don't Write On The 1st Page Backside.
- Question Paper is divided into Three Parts -A, B & C.
- Part-A is containing 10 multiple choice & 5 Very Short questions.
- Part- B containing SIX questions out of which FOUR questions are to be answered.
- Part C containing FOUR questions out of which TWO questions are to be answered.
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**Multiple Choice Questions**

[10x1=10]

1. Electron Microscope can give a magnification up to  
a) 400,000X  
b) 100,000X  
c) 15000X  
d) 100X
2. Which force is involved in the chromatography?  
a) Hydrogen Bonding  
b) London Force  
c) Electric Static Force  
d) All of the above
3. In a chromatographic separation, which of the following is most appropriate for the qualitative analysis of a substance?  
a) Retention Time  
b) Capacity Factor  
c) Taking Factor  
d) Resolution
4. Select the wavelength range corresponding to UV-Visible region  
a) 400-800 nm  
b) 200-800 nm  
c) 25-2.5-micron m  
d) 2.5-micron m-1 mm
5. Which of the following spectroscopy techniques is associated with molecular emission?  
a) UV-Visible Spectroscopy  
b) IR Spectroscopy  
c) X-ray diffraction  
d) Fluorescence Spectroscopy

**PART - A**

6. Which of the following is a real limitation to Beer's law
- Analyte dissociation
  - Analyte at high concentrations
  - Fluorescence
  - Polychromatic radiation is used as source.
7. Which factors are affecting electrophoresis mobility
- Molecular size
  - Both molecular size and shape of protein
  - The most common type of gel used for DNA separation is
    - Agar
    - Agarose
    - Polyacrylamide
    - All of the above
  - An emission technique
  - A UV-Vis technique
8. The distance between the two adjacent crests or troughs of a wave is called its
- Frequency
  - Wavelength
  - Wave number
  - Velocity

[5x2=10]

**Very short question**

- Biosensor
- Beer-Lambert Law
- pH meter
- Immunolectrophoresis
- Agarose

**PART - B**

**Answer any FOUR out of SIX**

[4x5=20]

- Write short notes on
  - Isoelectric focusing
  - HPLC
- Differentiate between preparative and analytical centrifugation.
- Write the application of nanotechnology.
- Write the difference between SEM and TEM.
- What is basic principle and application of phase contract microscope?
- What is Immunolectrophoresis? Write the applications of Immunolectrophoresis.

**PART - C**

**Answer any TWO out of FOUR**

[2x10=20]

- Describe the working and application of UV-visible spectrometer.
- What is Biosensor? Write the instrumentation and application of Biosensor.
- Describe the procedure and application of ion-exchange chromatography.
- Describe the different part of electron microscope. Write the difference between electron microscope and optical microscope



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**PART - A**

**Multiple Choice Questions**

**[10x1=10]**

1. Fusion of Two protoplasts with one nucleus each is called
  - a) Cybrid
  - b) Hybrid
  - c) Somatic hybrid
  - d) Zygote
2. Rapid multiplication of clones, multiplication of disease free plants, requires minimum space for growing culture are characteristics of
  - a) Protoplast culture
  - b) Somatic embryogenesis
  - c) Micropropogation
  - d) Cell suspension culture
3. This technique was helpful in breaking dormancy of certain seeds
  - a) Somatic embryogenesis
  - b) Embryo reuse
  - c) Ovary culture
  - d) Meristem culture
4. Callus culture is effected by
  - a) Growth harmony
  - b) Composition of medium
  - c) Temperature
  - d) All of these
5. Advantage of cell suspension culture
  - a) Production of secondary metabolite
  - b) Production of primary metabolites
  - c) Both a and b
  - d) None of these

6. The removal of embryo from a seed and growing that on MS medium is called
  - a) Embryo Culture
  - b) Seed Culture
  - c) Suspension Culture
  - d) Endosperm Culture
7. Activated charcoal is used in nutrition media to \_\_\_\_\_
  - a) Absorb toxic substances
  - b) Absorb moisture
  - c) Absorb elements
  - d) Absorb microbes
8. Which of the following is best suited method for production of virus free plants
  - a) embryo culture
  - b) Meristem culture
  - c) Ovule culture
  - d) Anther culture
9. HgCl<sub>2</sub> and NaOCl are used in
  - a) Protoplast Fusion
  - b) Induction
  - c) Chemical Sterilisation
  - d) Callus Formation
10. Final stage in tissue culture before the new plant are taken out for cultivation is
  - a) Caulogenesis
  - b) Embryogenesis
  - c) Hardening
  - d) Rhizogenesis

**Very short question**

[5x2=10]

- a) Somatic hybrid
- b) Heterokaryon
- c) Artificial seeds
- d) Soma clonal variation
- e) Escape

**PART - B**

**Answer any FOUR out of SIX**

[4x5=20]

1. What are the applications of soma clonal variation?
2. What are the steps of somatic hybridisation?
3. Discuss methods of sterilisation in plant tissue culture.
4. Discuss application of protoplast culture.
5. Discuss advantages of meristem culture technique.
6. What are factors which affect anther or pollen culture?

**PART - C**

**Answer any TWO out of FOUR**

[2x10=20]

1. Write applications of Plant tissue culture technique.
2. Define protoplast culture. How protoplast is isolated and what are steps for protoplast culturing?
3. What is soma clonal variation? Discuss its advantages and limitations.
4. Write in detail basic steps in plant tissue culture lab?



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**6<sup>th</sup> Semester End Term Examination: 2021-22.**

**Subject : Genomics and Proteomics**

**Roll No: .....**

**Course : B. Sc. Biotechnology**

**Full Marks : 60**

**Time : 3 Hours.**

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**PART - A**

**Multiple Choice Questions**

**[10x1=10]**

1. Most widely used method to assess Protein purity  
a) Isoelectric focusing  
b) Gel filtration Chromatography  
c) Sequencing  
d) SDS Page
2. Secondary structure is defined by \_\_\_\_\_.  
a) Hydrogen bonding  
b) Vander Waals Forces  
c) Covalent bonding  
d) Ionic bonding
3. Which amino acids are rarely present in alpha helix  
a) Glycine and Proline  
b) Proline and Tryptophan  
c) Proline Only  
d) Glycine Only
4. Chain Termination Method is also called  
a) Sanger Dieoxy Method  
b) Maxam Gilbert Method  
c) Pyro Sequencing  
d) Next Generation Sequencing
5. Complete set of proteins expressed by an organism is  
a) Proteome  
b) Proteomics  
c) Transcript  
d) Transcriptome

6. Coomassie blue is
- |                            |                             |
|----------------------------|-----------------------------|
| a) Loading dye for DNA     | b) Staining dye for Protein |
| c) Loading dye for Protein | d) Staining dye for DNA     |
7. All statement regarding peptide bond are correct except
- |  |  |
|--|--|
| a) It is covalent                        | b) It is planar and rigid                    |
| c) It is partially double bond character | d) It is formed by non condensation reaction |
8. In this sequencing method vast amount of computing power is required
- |                          |   |
|--------------------------|---|
| a) Clone counting method | b) Shotgun method                         |
| c) Pyrosequencing method | d) None of these require computing method |
9. Genome is
- |  |  |
|--|--|
| a) Haploid set of chromosome of multicellular Organism | b) Diploid set of chromosome of multicellular Organism |
| c) Total no. of genes in a single chromosome           | d) None of these                                       |
10. Craig Venter is Owner of
- |          |                    |
|----------|--------------------|
| a) SCOP  | b) Celera genomics |
| c) GeneX | d) ProX            |

**Very short question**

[5x2=10]

- Define Curation.
- Define Annotation.
- Disadvantages of Maxam Gilbert method.
- structural Proteomics
- Peptide bond

**PART - B**

**Answer any FOUR out of SIX**

[4x5=20]

- Protein and peptide must be purified before analysis, list different ways of purification.
- Write importance of analysis of primary structure.
- Discuss principle of pyrosequencing.
- What are benefits of genome sequencing?
- What are properties of alpha helix?
- Differentiate between clone counting and shotgun method

**PART - C**

**Answer any TWO out of FOUR**

[2x10=20]

- Discuss applications of Genomics and proteomics.
- Write in detail Principle and working of Sanger Method.
- Explain 2D gel electrophoresis.
- Differentiate between SDS and Native PAGE.



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**Subject : Environmental Biotechnology**

**Roll No: .....**

**Course : B. Sc. Biotechnology**

**Full Marks : 60**

**Time : 3 Hours.**

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**PART - A**

**Multiple Choice Questions**

**[10x1=10]**

1. Which among the following is a competitive and sustainable alternative for environment?  
a) Bio-Leaching  
b) Bio-Remediation  
c) Bio-Fortification  
d) Immobilization
2. Oil spills have been considered as a major threat to world environment, especially \_\_\_\_\_.  
a) Marine ecosystem  
b) Terrestrial ecosystem  
c) Land ecosystem  
d) Vertebrates
3. The process of converting environmental pollutants into harmless product by naturally occurring microbes is called  
a) Exist Bioremediation  
b) Intrinsic Bioremediation  
c) Extrinsic Bioremediation  
d) None of the above
4. Environmental Biotechnology involves  
a) The use of microbes to clean up the environment  
b) Bioremediation  
c) The study of benefits and hazard associated with GMMs  
d) All of these
5. Which of the following bacterium is called as the superbug that could clean up oil spills?  
a) Bacillus Subtilis  
b) Pseudomonas putida  
c) Pseudomonas denitrificans  
d) Bacillus denitrificans

6. VAM stands for
- |                                   |                                    |
|-----------------------------------|------------------------------------|
| a) Vascular Mycorrhiza            | b) Vesicular Mycorrhiza            |
| c) Vascular Arbuscular Mycorrhiza | d) Vesicular Arbuscular Mycorrhiza |
7. Mycorrhiza exhibits the phenomenon of
- |                     |               |
|---------------------|---------------|
| a) Parasitism       | b) Symbiosis  |
| c) Protocooperation | d) Antagonism |
8. The bioremediation process involving the usage of plants to degrade pollutants is \_\_\_\_.
- |                     |                 |
|---------------------|-----------------|
| a) Composting       | b) Bio pile     |
| c) Phytoremediation | d) Land farming |
9. Bio augmentation involves \_\_\_\_\_.
- |  |                                    |
|--|------------------------------------|
| a) Eliminating sludge                      | b) Plants usage for bioremediation |
| c) Addition of microbes to a clean-up site | d) Bioventing                      |
10. Which clean-up approach includes removal of groundwater or soil from its natural setting to permit for bioremediation?
- |                           |                           |
|---------------------------|---------------------------|
| a) Bio Augmentation       | b) In situ bioremediation |
| c) Ex situ bioremediation | d) Phyto-remediation      |

**Very short question**

[5x2=10]

- |                       |
|-----------------------|
| a) Conventional fuels |
| b) Modern fuels       |
| c) Bioleaching        |
| d) Bioremediation     |
| e) Phyto-remediation  |

**PART - B**

**Answer any FOUR out of SIX**

[4x5=20]

1. What do you mean by modern fuels? State its environmental impacts?
2. State the microorganisms used for lignin degradation
3. State the microorganisms used for celluloses degradation
4. What do you mean by biofuels? What is the environmental impact of biofuels?
5. Define Bio fertilizers. Name the types of Bio fertilizers?
6. What do you mean by VAM? Discuss its environmental significance.

**PART - C**

**Answer any TWO out of FOUR**

[2x10=20]

1. What do you mean by bioremediation of oil spills? Explain the factors effecting bioremediation of oil spills.
2. Differentiate in situ and ex situ bioremediation of soil?
3. What do you mean by symbiotic and a symbiotic nitrogen fixing bacteria? Discuss its Environmental importance.
4. Explain Environmental significance of genetically modified microbes with example.