BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – B.Sc.(BT)-Hons-2024
Course Name – Emerging Trends in Biotechnology
Course Code - BBT20202
(Semester II)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Select the form of nitrogen absorbed by plants.
   a) Ammonia gas b) Nitrogen gas
   c) Nitrate d) Nitrite

(ii) Oxidation of ammonia into nitrate is called _____.
   a) Nitrosylation b) Denitrification
   c) Nitrification d) Ammonification

(iii) Indicate the primary purpose of PCR in molecular marker identification.
   a) To amplify specific DNA sequences b) To break down DNA into smaller fragments
   c) To visualize proteins in a gel d) To detect radioactively labeled probes

(iv) Indicate the role of Southern blotting in molecular marker analysis.
   a) To detect specific DNA sequences using hybridization b) To sequence entire genomes
   c) To amplify DNA using a thermal cycler d) To separate proteins based on size

(v) Report the first step in micropropagation
   a) Hardening of plantlets b) Multiplication of shoots
   c) Selection and sterilization of explants d) Transplantation to soil

(vi) Indicate the step that follows the digestion of DNA by restriction enzymes in RFLP analysis.
   a) PCR amplification b) Electrophoresis to separate DNA fragments
   c) Protein synthesis d) Transformation into bacterial cells

(vii) Define bacteriocins.

a) Lipid molecules that disrupt bacterial membranes
b) Peptides produced by bacteria that inhibit other bacteria
c) Toxins secreted by pathogenic E. coli
d) Antibiotics produced by fungi

(viii) Indicate what makes lactic acid bacteria a suitable candidate for probiotic use.

a) Their ability to ferment milk
b) Their antimicrobial and gut-health-promoting properties
c) Their production of synthetic chemicals
d) Their ability to increase food acidity beyond safe levels

(ix) Define metagenomics.

a) Study of genetic material from uncultured microorganisms
b) Study of human microbiomes only
c) Study of only viruses in an ecosystem
d) Study of only pathogenic bacteria

(x) Identify the reagent that is commonly used in lipofection.

a) Polyethylene glycol (PEG)
b) Lipofectamine
c) Calcium chloride
d) Triton X-100

(xi) Name the assay used to check for pluripotency marker expression post-transfection.

a) ELISA
b) RT-PCR
c) Chromatography
d) Southern blot

(xii) Name the pigment used in the pharmaceutical industry for its antimicrobial properties.

a) Carotenoids
b) Prodigiosin
c) Astaxanthin
d) Melanin

(xiii) Select the pigment that gives Pseudomonas aeruginosa its characteristic color.

a) Prodigiosin
b) Pyocyanin
c) Carotene
d) Xanthophyll

(xiv) Indicate the pigment associated with UV protection in extremophiles.

a) Astaxanthin
b) Melanin
c) Prodigiosin
d) Violacein

(xv) Identify the microbial pigment used in cosmetics for its antioxidant properties.

a) Violacein
b) Prodigiosin
c) Astaxanthin
d) Pyocyanin

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Compare synthetic dyes and natural microbial pigments in terms of production, safety, and sustainability. (3)
3. Describe biosensors. What types of pollutants can biosensors detect? (3)
4. Describe how does antisense RNA technology work. (3)
5. Define immunotechnology. How does immunotherapy help in cancer treatment? (3)
6. Analyze the key applications of metagenomics in medicine. (3)

OR

Analyze the key applications of metagenomics in agriculture. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Determine the significance of immunotechnology in disease diagnosis and therapy. (5)

8. Briefly explain the role of genetic engineering in improving agricultural productivity. (5)
9. What are molecular markers? How are they important in identification of transgenics? (5)
10. Explain the role of probiotics in preventing intestinal infections and improving gut health. (5)
11. What are the enterotoxins produced by the Entero toxigenic E. coli (ETEC) and their respective mechanisms of action? (5)
12. Explain how biotechnology is used in developing personalized medicine and targeted drug delivery systems. (5)

OR

Infer the potential benefits of using probiotics in animal feed, and how this relates to human health? (5)

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