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BRAINWARE UNIVERSITY

Term End Examination 2024-2025

Programme – M.Sc.(MLT)-2024

Course Name – Medical Molecular Biology & Biotechnology

Course Code - MMT02001

(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) Choose the organelle where translation occurs in eukaryotic cells:
 - a) Nucleus
 - b) Mitochondria
 - c) Ribosome
 - d) Golgi apparatus
- (ii) Name the process where RNA is synthesized from a DNA template
 - a) Translation
 - b) Replication
 - c) Transcription
 - d) Reverse transcription
- (iii) Which enzyme is used to synthesize cDNA from mRNA in a cDNA library?
 - a) RNA polymerase
 - b) DNA ligase
 - c) Reverse transcriptase
 - d) Restriction enzyme
- (iv) Apply the knowledge Newborn screening tests are typically performed within what timeframe after birth?
 - a) Within 24 hours
 - b) Within 48 hours
 - c) Within 1 week
 - d) Within 1 month
- (v) Compare which of the following is a characteristic of monoclonal antibodies produced by hybridoma technology?
 - a) They are heterogeneous
 - b) They recognize multiple antigens
 - c) They are produced by different cell lines
 - d) They are highly specific to a single antigen epitope
- (vi) Analyse what role does the myeloma cell line play in hybridoma technology?
 - a) It produces antibodies
 - b) It provides a continuous source of growth factors

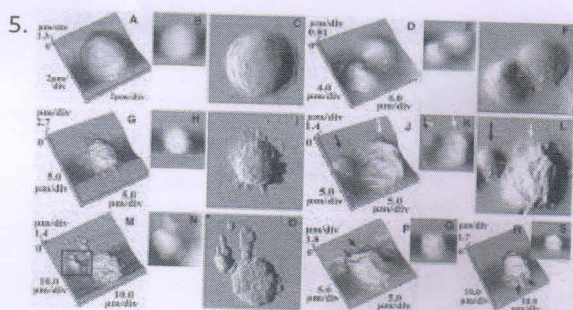
- c) It kills the B cells
d) It acts as a fusion partner and immortalizes the antibody-producing cells
- (vii) Select which cells are fused together in hybridoma technology?
a) B cells and T cells
b) T cells and macrophages
c) B cells and myeloma cells
d) Red blood cells and white blood cells
- (viii) Choose What does the intensity of DNA bands on a gel indicate?
a) The size of the DNA fragments
b) The concentration of DNA fragments
c) The charge of the DNA fragments
d) The shape of the DNA fragments
- (ix) List which of the following statements about the gel used in DNA electrophoresis is correct?
a) A higher percentage agarose gel is used for smaller DNA fragments
b) A lower percentage agarose gel is used for smaller DNA fragments
c) Agarose gel concentration does not affect separation of DNA fragments
d) Ethidium bromide is not needed in the gel
- (x) Which of the following is NOT a use of FISH technology?
a) Identifying chromosomal abnormalities
b) Detecting gene amplification
c) Determining protein structures
d) Locating specific DNA sequences on chromosomes
- (xi) Select what does a flow cytometer measure when cells pass through its laser beam?
a) Cell size and granularity
b) Cell shape and volume
c) Cell membrane thickness
d) Cell cytoplasmic pH
- (xii) What does light emit as forward side scatter (FSC) measure?
a) Cell size
b) Cell granularity / complexity
c) Cell surface marker fluorescence
d) Threshold
- (xiii) Select the term that best describes the electron beam interaction with the sample in SEM:
a) Transmission
b) Reflection
c) Absorption
d) Scattered electron
- (xiv) Choose the appropriate technique used to study the surface morphology of materials at high resolution:
a) TEM
b) AFM
c) X-ray crystallography
d) NMR spectroscopy
- (xv) Choose the step in MALDI-TOF mass spectrometry where the ions are separated based on their time of flight:
a) Ionization
b) Acceleration
c) Detection
d) Mass analysis

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Write a short note on Chaperon and Protein folding (3)
3. Describe the Genetic Basis of Thalassemia. (3)
4. Define Fluorescent In Situ Hybridization (FISH) (3)



(3)

Illustrate the results and find the distinct property of the sample.

6. Correlate Point-mutation with molecular biology diagnosis

(3)

OR

Compare the Role of Transcription Factors in Transcription?

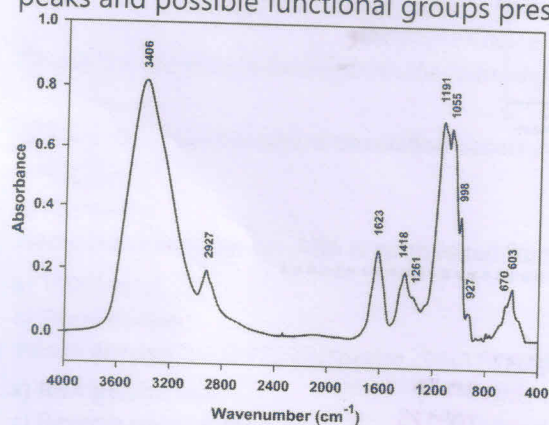
(3)

Group-C

(Long Answer Type Questions)

5 x 6=30

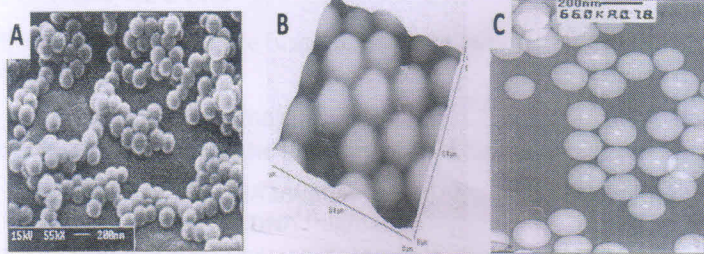
7. Discuss the Clinical Features and Complications of Thalassemia Major. (5)
 8. Correlate the role of RFLP in the diagnosis of diseases (5)
 9. FTIR spectrum of a compound. Interpret the spectrum, identifying the major peaks and possible functional groups present. (5)



10. In a population of cats, the allele for black fur (B) is dominant over the allele for white fur (b). If 64% of the cats in the population have black fur, what percentage of the population is heterozygous for fur color? (5)
 11. Correlate the pattern of inheritance of Autosomal recessive and (sex chromosome)-linked inheritance (5)

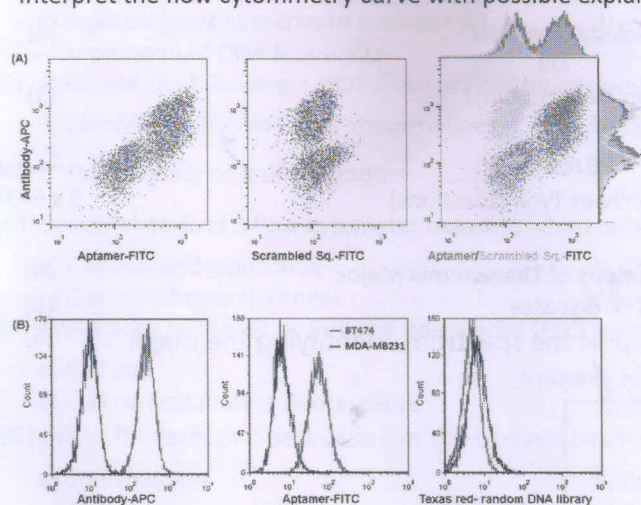
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12. Identify the microscopic image from the following and interpret its one characteristic feature. (5)



OR

Interpret the flow cytometry curve with possible explanation. (5)



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