



Shivaji College, University of Delhi

Department of Biochemistry

B.Sc. (Hons.) Biochemistry – IIIrd Year; Semester-V

DSE PAPER: Advanced Cell Biology

(Unique Paper Code-32497906)

Total Marks: 25
Sept. 18, 2023

1. Write the contributions of the following scientists: (5)
 - a) Masui & Markert
 - b) Sydney Brenner
 - c) Blobel
 - d) Time Hunt
 - e) Robert Hortviz

2. Differentiate between the following :
 - a) SEM and TEM
 - b) Primary and secondary cell culture(3, 2)

3. Explain the principle and give two applications of the following:
 - a) Immunohistochemistry
 - b) FACS
 - c) Ultracentrifugation(5, 5, 5)

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Dr. Sunita Singh



B.Sc (Hons.) Biochemistry- IIIrd Year

SEM V

DSE PAPER: Advanced Cell Biology (UPC: 32497906)

Total Marks: 25

October 10, 2023

1. Applications of Embryonic stem cells & adult stem cells for therapeutic applications
Characteristics of transformed cells.
2. What are check points in different phases of cell cycle and discuss briefly how the cells having damaged DNA are restricted from undergoing progression through cell cycle.
3. Why is cell death via apoptosis more advantageous to multicellular organisms than the cell death via acute injury? Explain the different pathways of apoptosis.
4. Describe four major differences between transformed cells and normal cells.
5. Differentiate between Anaphase A and Anaphase B mechanism of chromosome movement.

(5, 6, 7, 4, 3)

Dr. Sunita Singh

B.Sc (Hons.) Biochemistry- IIIrd Year (SEM V)
DSE PAPER: Advanced Cell Biology (UPC: 32497906)

Total Marks: 15
October & November, 2023

SEM V Presentations:

1. Animal tissue culture- Sparsh
2. Confocal microscopy- Ranjit
3. FACS- Shivangi
4. Heme agglutination- Disha
5. Apoptosis- Ayush
6. Cell cycle- Sayena
7. Cell checkpoints- Sanjana
8. Stem cells- Sahil, Himani
9. Plant tissue culture- Simran, Harshita
10. Electron microscopy- Rumi, Bhavya
11. FRET- Vandana
12. Ultracentrifugation- Bhumika
13. FRAP- Anusha
14. Immunohistochemistry- Nitika
15. mRNA vaccine- Khushi
16. Cloning- Sony, Priyanka



Dr. Sunita Singh

B. Sc (Hons.) Biochemistry- IIIrd Year
(SEM V-Dec. 2023)

DSE PAPER: Advanced Cell Biology (UPC: 32497906)

Total Marks: 20

Assignment

Q1. What do you mean by kinetochore complex? How does the function of kinetochore complex vary in mitosis versus meiosis I?

6

Q2. Briefly explain the following:

- a) In Vitro fertilization (IVF)
- b) Cytokinesis
- c) Polar bodies
- d) Cytostatic factor (CSF)

8

Q3. Explain the regulation of cell cycle in response to various checkpoints. Name the point in cell cycle beyond which the cells can progress independent of the availability of growth factors.

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DSC PAPER: BIOCHEMICAL TECHNIQUES

Sept 13, 23

MM = 25

Q1. State true or false. Justify the following statements in both cases.

- i. Quartz cuvettes are used in UV spectrophotometer
- ii. The Beer's Law is not applicable to polychromatic light
- iii. Tungsten lamp is used in UV spectrophotometer
- iv. All fluorescence compounds have cyclic structures
- v. Cuvettes used in spectrofluorimetry are transparent on all four sides

10

Q2. The absorbance, A of a 5×10^{-4} M solution of the amino acid tyrosine, at a wavelength of 280nm is 0.75. The path length of the cuvette is 1 cm. Calculate the molar absorption coefficient.

5

Q3. Describe the principle of a spectrofluorimeter and write two applications of the technique.

5

Q4. Mention the function of the following parts of the Spectrophotometer:

- i. Monochromators
- ii. Photomultiplier Tube

5

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Department of Biochemistry
SEM I: BIOCHEMICAL TECHNIQUES

October 11, 2023

Max. Marks = 20

1. Describe the principle of the following: (5)
 - Ion-exchange chromatography
 - Gel permeation chromatography
2. Differentiate between the following: (5)
 - Paper and TLC chromatography
 - Cation and anion exchangers (with an example of each)
3. Define the following terms: (4)
 - Elution
 - Spacer arm
 - Theoretical plates
 - Distribution coefficient
4. Name the group-specific ligands commonly used in affinity chromatography for the following: (2)
 - NADP⁺-dependent dehydrogenases
 - Biotin-containing enzymes
 - Immunoglobulin's
 - Glycoproteins
5. Mention the four attributes of ideal chromatography bed material (matrix) to which the ligand is covalently bound. (4)

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SEM I: BIOCHEMICAL TECHNIQUES

November 30, 2023

MM = 15

CENTRIFUGATION

2. Define sedimentation coefficient. Why does a denser particle have a higher sedimentation coefficient? (3)
3. What is the principle of centrifugation. Elaborate on the various kinds of rotors used in centrifugation. (4)
4. Differentiate between differential and density gradient centrifugation. (4)
5. Write two applications of centrifugation. (2)
6. In a centrifuge machine, the sample is spun at 10,000 rpm with rotor's radius 10.8 cm. Calculate the 'g' value. (2)

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