

FIVE YEAR INTEGRATED M.Sc., EXAMINATION 2023
SEMESTER - VII
Paper LS-4-7-2
Methods in Biology - I

Time: Four Hours

Full Marks: 80

Questions are of value as indicated in the margin.
Answer ***Question No.01*** and ***any four*** from the rest.

1. Write short notes on ***any ten*** of the following: 10 x 2 = 20
 - a. LNA
 - b. Transcriptome
 - c. Ligase
 - d. Plasmid
 - e. YAC
 - f. ddNTP
 - g. Alkaline phosphatase
 - h. Competent cells
 - i. RAPD
 - j. CRISPR-Cas-9
 - k. Cre-Lox system
 - l. Salting out

2. Describe any three NGS platforms based on DNA polymerases. (3X5=15)

3. Describe any five methods of transferring foreign DNA into animal cells. (5x3=15)

4.
 - a. Briefly describe different steps in making gDNA library using plasmids. (6)
 - b. Briefly describe protein sequencing method by Pehr Edman. (4)
 - c. Describe a NGS method based on ligase at the time of detection. (5)

5.
 - a. Write short notes on Southern blotting. (5)
 - b. Briefly describe features you would like to have in an expression vector for protein over expression. (5)
 - c. Write short notes on SDS-PAGE. (5)

6. a. Briefly describe Real-time PCR using TaqMan® probes including its principle. (5)
- b. Briefly describe how proteome of two different tissue samples can be compared using DIGE taking suitable examples. (5)
- c. Briefly describe first strand cDNA synthesis using random hexamer primers. Discuss its merits and demerits. (3+2=5)
7. a. Describe a micro-array platform to compare transcriptome of two different tissues where two different microarrays are used for each of the tissues. (5)
- b. A hypothetical transcript A has 5 exons each having a length of 500 bp and the sequences are unique. Splice variant 1 has all 5 exons and splice variant 2 has exons 1, 3 and 5. Splice variant 3 has four exons 1, 2, 4 and 5 whereas splice variant 4 has only two exons 1 and 5. In lungs splice variants 1 and 4 are expressed. In heart and kidney splice variants 2 and 3 are expressed respectively.
- Answer the following questions based on the information given above.
- (i) Draw a schematic diagram depicting the above information. (1)
- (ii) Draw primer positions that can be used to detect relative expression of these transcripts using PCR (qRT-PCR using SYBR® Green detection). Justify your answer in each of the three tissues. (3x3=9)