Five Year Integrated M.Sc. Examination, 2019

Semester - VIII

Course: LS-4-8-1

(Life Science: Techniques in Biology)

Time: Four Hours **Full Marks: 80**

Questions are of value as indicated in the margin.
Answer ***Question No.1*** and ***any four*** from the rest.

1. Write short notes on ***any ten*** of the following: 2x10=20
   a) PFGE and its use
   b) Mention any two animal cell culture media components that need to be sterilized by filtration.
   c) Exons and introns
   d) Insertional mutagenesis by PCR
   e) Usage of proteases in the passage of adherent cell lines.
   f) Isoelectric focusing
   g) A given sample of 200 times diluted RNA solution gives an Absorbance value of 0.2 at 260 nm. What is the concentration of the undiluted solution?
   h) Body labelling
   i) FCS in animal cell culture medium
   j) Transcriptome
   k) Difference between sterilization and disinfection.
   l) Tyndalization

2. a) Name and describe parallel sequencing methods that make use of PPi (inorganic pyrophosphate) and H^+ ion liberated during addition of nucleotides by polymerase enzyme. 5+5
   b) Describe sterilization by autoclaving. 5

3. a) Describe Class II biosafety cabinet, its advantages and disadvantages. 5
   b) What is quantitative real time PCR? 2
   c) Using PCR, describe a method how you could enrich differentially expressed transcripts in two different populations of cells. 5
   d) What is emulsion PCR and mention its use? 3

4. a) What is HAT medium? 2
   b) Explain its use in the selection of hybridoma cells. 5
   c) What is SDS-PAGE? 1
   d) Explain SDS-PAGE. 5
   e) How is SDS-PAGE different from native PAGE? 2

5. a) Write about any two methods for the detection of Mycoplasma in cell culture. 4
   b) Explain sequencing by modified Sanger method using dideoxy nucleotides with different fluorophores attached to them. 5
   c) How is 2-D gel electrophoresis different from DIGE? 4
   d) Among 2-D gel electrophoresis and DIGE, which one do you think is better for comparing the proteomes of two different samples and why? 2

6. a) Explain cryopreservation. 5

P.T.O.

b) Using SYBR® Green and PCR how will you compare transcripts in two different populations? 5

c) Explain Southern Blotting. 5

7. a) Compare and contrast affinity column chromatography and size exclusion chromatography. 5

b) In a hypothetical situation, Transcript A that has five exons numbered 1 to 5 with sizes 100bp, 200bp, 300bp, 400bp and 500bp respectively is expressed in all tissues of mouse. In addition, in liver, heart and kidneys splice variants of transcript A without exons 2 and 3, 3 and 4, and 4 alone respectively are also expressed.

i) Draw a schematic diagram of all the splice variants of transcript A. 2

ii) Draw primer positions you would ideally take for cloning full length as well as the individual splice variants and mention the tissue that you would take. 1

iii) By PCR, to make a template for individual splice variant specific probes for Northern Blotting, draw the ideal primer positions. Substantiate your answer with adequate explanation. 4

iv) With the probes designed in (iii), with suitable diagram, discuss the Northern Blot results you would observe that shows the mentioned scenario in liver, heart and kidney samples. 3

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