2023

QUESTION PAPER

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BIOTECHNOLOGY PAPER 1
(THEORY)

Maximum Marks: 70

Time Allowed: Three hours

*(Candidates are allowed **additional 15 minutes** for **only** reading the paper.*
*They must **NOT** start writing during this time.)*

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*Answer all questions in **Section A, Section B** and **Section C.***
The intended marks for questions or parts of questions are given in brackets [ ].

SECTION A – 14 MARKS

Question 1

(i) _____ are double ringed nitrogenous bases. **[1]**

(ii) Vectors that possess the characteristics of both bacteriophage Lambda and plasmids are called _____. **[1]**

(iii) In which of the following techniques, labelled antibodies are used as probes? **[1]**

(a) Southern Blotting

(b) Northern Blotting

(c) Western Blotting

(d) DNA finger printing

(iv) The enzyme used to tenderise and enhance the taste of canned and dried meat is: **[1]**

(a) Rennet.

(b) Papain.

(c) Subtilisin.

(d) Amylase.

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(v) State whether the following statements are True or False. Give a reason in support of your answer.

(a) During gel electrophoresis, DNA fragments migrate towards the anode. [1]

(b) The factor required for the initiation of the process of transcription is called the *rho factor*. [1]

(vi) Define the following:

(a) *Hybridoma* technology [1]

(b) *Proteomics* [1]

(vii) Differentiate between the following:

(a) *Monocistronic RNA* and *Polycistronic RNA* [1]

(b) *Cohesive ends* and *Flush ends* [1]

(viii) Expand the following:

(a) PHB [1]

(b) DMEM [1]

(ix) **Assertion** : *lac operon* is an inducible operon. [1]

Reason : The process of transcription in *lac operon* occurs only in the presence of lactose.

(a) Assertion and Reason are true, and Reason is the correct explanation for Assertion.

(b) Assertion and Reason are true, but Reason is not the correct explanation for Assertion.

(c) Assertion is true but Reason is false.

(d) Both Assertion and Reason are false.

(x) **Assertion** : The concept of *split gene* is applicable only to eukaryotes. [1]

Reason : Eukaryotic genome is divided into introns and exons.

(a) Assertion and Reason are true, and Reason is the correct explanation for Assertion.

(b) Assertion and Reason are true, but Reason is not the correct explanation for Assertion.

(c) Assertion is true but Reason is false.

(d) Both Assertion and Reason are false.

SECTION B – 28 MARKS

Question 2 [4]

Write short notes on the following:

(i) *Blue-White selection method*

(ii) *Reverse Transcription*

Question 3 [4]

(i) Briefly explain the following:

(a) Colorimetry

(b) Growth regulators in plant cell culture

OR

(ii) Briefly explain the following:

(a) Biolistic

(b) Edible vaccines

Question 4 [4]

State *any two* differences between the following:

(i) YAC and BAC

(ii) Synthetic Culture Medium and Semi Synthetic Culture Medium

Question 5 [4]

(i) Discuss the process of animal cloning.

OR

(ii) Discuss the process of the development of recombinant human insulin.

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Question 6 [4]

Give reasons for the following:

(i) Golden rice is more nutritious than the normal rice.

(ii) *Flavr Savr* tomato can be stored for a long time.

Question 7 [4]

Explain *any four* methods of sterilization used in cell culture technology.

Question 8 [4]

Explain the process of PCR technique.

SECTION C – 28 MARKS

Question 9

(i) Discuss the role of *any four* enzymes involved in DNA replication in prokaryotic organisms. [4]

(ii) State *any three* differences between Southern blotting and Northern blotting. [3]

OR

(i) Explain the process of *protoplast* fusion. [4]

(ii) State *any three* differences between FASTA and BLAST. [3]

Question 10

(i) Discuss the levels of stem cells on the basis of their developmental potential. [4]

(ii) Explain the Clover leaf model of *tRNA*. [3]

Question 11

(i) ***Figure 1*** shows an important process. Study the figure given below and answer the questions that follow: **[4]**

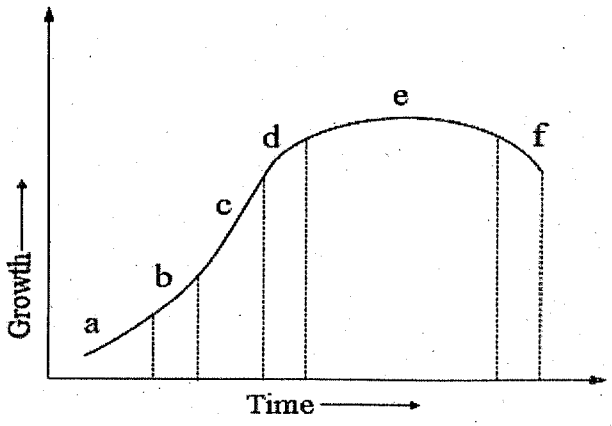


Figure 1

(a) Which type of microbial culture's growth kinetics is depicted in ***Figure 1***?

(b) Mention the difference in the metabolic activity of microbes considering phase " **c** " and phase " **f** ".

(c) Why is phase " **e** " almost a straight line?

(d) What happens in phase " **a** " ?

(ii) ***Figure 2*** shows an important technique of gene transfer. Study the figure given below and answer the questions that follow: **[3]**

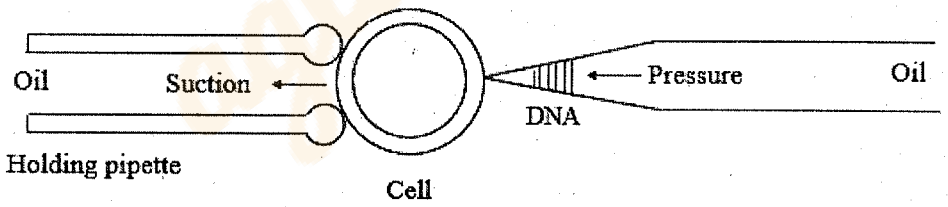


Figure 2

(a) Identify the method / technique of gene transfer shown in ***Figure 2.***

(b) Name the device / instrument used for this technique.

(c) Name another technique which can be used for the same purpose.

Question 12

Read the following passage and answer the questions that follow.

In a well reputed hospital located in a city, four infants were born to different couples on the same day. The nurse on duty made a mistake and put the wrong identification tags on two infants.

Three days later, both the couples complained that the infants did not belong to them and asked the hospital authorities to resolve the issue. The hospital management involved the Forensics department to solve this case.

(i) Name the technique that can be used by the Forensics department to solve this case. **[1]**

(ii) Describe the major steps in the technique that can be used. **[4]**

(iii) Name *any one* type of cells that can be used to initiate this technique. **[1]**

(iv) In which other situation can this technique be used? **[1]**

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