

2020

MICROBIOLOGY — HONOURS

Fifth Paper

(Group - B)

Full Marks : 50

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

PART - A

Answer *question no. 1* and *any one* question from the rest.

1. Briefly justify whether the following statements are *true* or *false* (*any five*) : 3×5
- (a) Air lift bioreactors are also known as pneumatic bioreactors.
 - (b) Production strains for amino acids are usually auxotrophic mutants.
 - (c) Semi-synthetic antibiotics are prepared to overcome antibiotic resistance.
 - (d) Wild type strains are suitable for industrial production.
 - (e) The carbon to nitrogen ratio of the medium can influence the yield of an antibiotic during its fermentative production.
 - (f) Glycerol is added to a lyophilisation mix to lower its freezing point.
 - (g) Antibiotics should be autoclaved regularly to keep them sterile.
 - (h) Ethanol production is not affected by the presence of dissolved air in the media.
2. (a) Describe any one method for immobilization of enzymes. How will the method differ if you want immobilization of cells?
- (b) State one advantage and one disadvantage of the method you have described. (4+3)+3
3. (a) Describe suitable methods for preservation of the following :
- (i) *Aspergillus niger*
 - (ii) Protozoa
 - (iii) *Bacillus subtilis*
 - (iv) Poliovirus.
- (b) What are cryoprotecting agents? Give two examples. (1½×4)+(3+1)

Please Turn Over

4. (a) Explain the term pseudovitamin.
(b) Discuss the importance of downstream processing in industrial production.
(c) Name two micro-organisms used in the industrial production of vitamin B12. 3+4+3
5. Write short notes on (*any two*): 5×2
(a) Packed bed bioreactor
(b) Protoplast fusion technique
(c) Seed tank
(d) Aspect ratio of a fermenter
(e) Microbial inhibition spectrum.

PART - B

Answer *question no. 6* and *any one* question from the rest.

6. State *true* or *false* for the following statements with explanation (*any five*). 3×5
(a) Size exclusion chromatography is generally used to isolate a particular mRNA.
(b) Phenol is useful for isolation of DNA.
(c) Gamma— $^{32}\text{PdATP}$ can be used for labelling DNA during PCR.
(d) Protein purification is normally carried out in cold room.
(e) Both a forward and a reverse primer are essential for sequencing a DNA fragment.
(f) His-tagged proteins can be purified by affinity chromatography.
(g) During western blotting, the primary antibody is added directly to the membrane right after the transfer of proteins to the membrane.
(h) RFLP can be used to determine closeness between species.
7. (a) How do you label the 5'-end of a double stranded DNA?
(b) What is disarmed Ti plasmid? Why is it used with a helper plasmid?
(c) How is Klenow fragment used to create a blunt ended DNA fragment containing 5'-overhang? 3+(3+1)+3
8. (a) Discuss the problems one may face while over expressing a protein in *E. coli*.
(b) Comment on the use of alkaline phosphatase in cloning DNA.
(c) State the basic differences between Dot blotting and Southern blotting.
(d) 'PCR-primers are usually made at least 20 base long.'— Justify. 3+3+3+1

(3)

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9. (a) Which type of restriction enzymes is (are) generally used in recombinant DNA technology and why?
(b) Describe the advantages of phagemid as a cloning vector.
(c) State the role of SDS and 70% ethanol in genomic DNA isolation from bacteria.

(1½+2½)+2+(2+2)

10. Write short notes on (*any two*) :

5×2

- (a) Star activity of restriction enzyme
 - (b) Homopolymer tailing
 - (c) Insertional inactivation
 - (d) Inducible promoter
 - (e) Northern blotting.
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