2018

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 two*** from the rest

1. Briefly justify whether the following statements are ***True*** or ***False*** (***any five***): 2×5

(a) Antifoaming agents should not be used in Vit B_{12} production.

(b) Air for aeration in bioreactors are often sterilized using HEPA.

(c) Glycerol is a good example of cryoprotective agent.

(d) Semi synthetic antibiotics are prepared to overcome antibiotic resistance.

(e) Citric acid is an example of secondary metabolite.

(f) Fruit juices can be used as substrate for ethanol production for use as fuel.

(g) Ultrasonication is the best used technique for cell disruption in industrial scale.

(h) The carbon to nitrogen ratio of the medium can influence the yield of an antibiotic during its fermentative production.

2. (a) State the chief characteristic features of solid state fermentation. How does it greatly differ from submerged fermentation?

(b) Illustrate two examples of production using solid state fermentation.

(c) Describe the agitation system used in bioreactors. Why are these agitation system used? (2+1)+1+(2+1½)

3. (a) Define antibiotic.

(b) Why is antibiotic called a secondary metabolite?

(c) What are vitamins and what are pseudovitamins?

(d) Name the microorganisms used in the industrial production of vitamin B_{12}. 2+1½+2+2

4. (a) The fermentative production of acetic acid requires stringent control of (i) producer organism, (ii) raw material, (iii) temperature, (iv) pH and (v) product separation and purification. Explain the measures taken under each factor to maximize product formation.

(b) What is aspect ratio of a fermenter? (1×5)+2½

5. Write short notes on (***any three***) : 2½×3

(a) Industrial centrifuges
(b) Cryopreservation
(c) Immobilization by carrier binding
(d) Static liquid fermentation
(e) Trophophase & Idiophase.

Part – B

Answer ***Question No.6*** and ***any two*** from the rest

6. Briefly justify whether the following statements are ***True*** or ***False*** (***any five***): 2×5

(a) gamma-^{32}PdATP can be used for labeling DNA during PCR.
(b) pUC-18 can be used as a vector for expression of a protein in bacteria.
(c) Blunt end ligation is easier than sticky end ligation.
(d) Shuttle vector is a vector that can replicate in only one specific host.
(e) Colony hybridization technique allows for the hybridization of two bacterial colonies.
(f) Pyrosequencing involves the usage of electrophoretic techniques.
(g) Human insulin expressed in recombinant bacteria is biologically inactive.
(h) Both a forward and a reverse primer are essential for sequencing a DNA fragment.

7. (a) How can it be demonstrated that poly (A) is at the 3′- end of mRNAs?
(b) Differentiate between heteroschizomers and isoschizomers.
(c) Which vectors are used in construction of genomic libraries? Why? 3½+2+2

8. (a) What role do restriction endonucleases play in nature?
(b) Comment on the nomenclature method of Type II restriction endonucleases with example.
(c) What is star activity and why does it happen?
(d) A particular restriction endonuclease recognizes and cuts a six base pair sequence. How many sites of that enzyme is mathematically probable in the lambda phage genome (given the size of lambda genome is 50 kbp). 1+2+2+2½

9. (a) Mention the properties of a cosmid vector.
(b) Why the promoters present in an expression vector are inducible rather than constitutive?
(c) How can you introduce flanking restriction sites through PCR?
(d) What do you mean by "strong promoter"? 3+2+1½+1

10. Write briefly on (***any three***) : 2½×3

(a) CDNA library
(b) VNTRs
(c) Ti-plasmid
(d) Homopolymer tailing
(e) Nested PCR.