2018

ZOOLOGY

ZOO : 301

TOOLS AND TECANIQUES

Full Marks: 80

Time: 3 Hours

The figures in the margin indicates full marks for the questions
Attempt all questions.

1. Answer the following multiple choice questions (any eight) **1x8=8**

I. Which one of the following is not a MALDI matrix compound?
   a. 3-Hydroxypicolinic acid
   b. α-Cyano-4- hydroxycinnamic acid (CHCA)
   c. Sinapinic acid (3,5-dimethoxy-4-hydoxycinnamic acid, SA)
   d. Diethyl amino ethyl cellulose (DEAE)

II. A fixed-angle rotor exhibits a minimum radius, r_{min}, at the top of the centrifuge tube of 3.5 cm, and a maximum radius, r_{max}, at the bottom of the tube of 7.0 cm. If the rotor is operated at a speed of 20 000 r.p.m., what is the relative centrifugal field (RCF) at the top of the centrifuge tube?
   a) 15,680 ***g***
   b) 31,360 ***g***
   c) 18,240 ***g***

d) 25,840 g

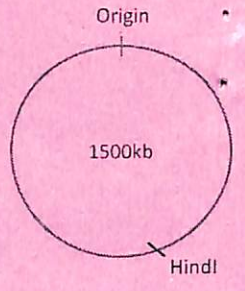
III. In Column chromatography, the stationary phase is made of _____ and the mobile phase is made of _____

a) Solid, liquid
b) Liquid, liquid
c) Liquid, gas
d) Solid, gas

IV. To elute target proteins from an affinity chromatography matrix, which of the following conditions would be the most appropriate?

a) Low salt concentrations
b) High salt concentrations
c) Adding a soluble ligand which competes with the affinity tagged protein for binding to the column
d) Just keep washing buffer through the column

V. A DNA fragment of 150kb is inserted into a plasmid of 1500 kb size at HindI site located 700 kb downstream of origin site. Inserted DNA fragment has a restriction site for EcoRI at 75 kb downstream of insertion site. Plasmid has also a restriction site for EcoRI at 25 kb upstream of origin site. If the DNA construct is digested first with HindI and secondarily with EcoRI, which one of the following will be incorrect?



a) After complete digestion 4 DNA fragments will form
b) Biggest fragment will be more than 850 kb size
c) Smallest fragment will be 75 kb
d) Two fragments will be same size

VI. After 5 rounds of PCR cycle a total of 45 numbers of fragments are produced from 3 initiator template fragments. What will be the efficiency of PCR amplification?

a) 69%
b) 72%
c) 74%
d) 81%

VII. Which one of the following techniques uses thermal behaviour of dsDNA and electrophoresis mobility to detect mutation in two similar genes?

a) Ligase Chain Reaction
b) Single Strand Conformational Polymorphisms
c) Denaturing Gradient Gel Electrophoresis
d) Mismatch Chemical Cleavage

VIII) Which one of the following is not a chemical transfection technique?

a) Lipofection
b) DEAE-dextran transfection
c) Calcium phosphate transfection
d) Microinjection

IX) Which one of the following is wrong about phosphoramidite?

a) It is a modified nucleoside unit used for chemical synthesis of nucleotides
b) Reactive amino group of bases are protected
c) Phosphate group is protected
d) Bases having no amino group do not require protection

2. Answer the following short answer type questions (any five) **2x5=10**

I. What are the difference between Southern and zoo blotting?

II. What is density gradient centrifugation? Name two important gradient material used in density gradient centrifugation.

III. What are the advantages of using Klenow fragment in molecular biology?

IV. What is phosphoramidite?

V. Differentiate between SEM and TEM microscopy.

VI. What is the advantage of 2D gel elctorphoresis?

3. Answer the following questions (any four) **5x4=20**

I. Write short notes on SDS PAGE gel electrophoresis.

II. Write short notes on siRNA technology.

III. What is immunoprecipitation technique? Write the advantages of flow cytometry technique. **2+3**

IV. Explain, how do you use ligase enzyme to detect mutation in DNA?

V. Write short notes on DNA footprinting technique.

4. Answer the following long answer type questions **9x2=18**

I. Describe principle, materials used and application of ion-exchange chromatography. How is it different from Affinity chromatography? **6+3**

or

Explain the principle and working of mass spectrometer. Write a short note on its applications. **6+3**

II. What is a substitution mutation? Suppose, a substitution mutation has changed a wild type DNA into mutant type; how do you use restriction enzymes to detect the presence of mutation? **2+7**

Or

What do you mean by transfection? Describe the types of transfection techniques with suitable diagram? **2+7**

5. Answer the following very long type questions **12x2=24**

I. Describe in detail about the Chemical and Enzymatic methods of DNA sequencing. Why do you think enzymatic method is better than Chemical method? **10+2**

Or

What is fidelity property of polymerase enzyme? Describe in details about the fundamental requirements and steps of a successful PCR running. **2+10**

II. Describe the structure, principle and working of electron microscope. How is it different from a light microscope? Write the advantage of electron miroscope over compound microscope. **8+2+2**

Or

Write short notes on the following: **4x3**

a) ELISA
b) Western blotting
c) Microtomy

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