KATHMANDU UNIVERSITY
End Semester Examination
August, 2018

Marks scored:

Level : B. Tech.
Year : III

Course : BIOT 306
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date : AUG 0 8 2018

SECTION "A"
[20 Q × 0.75 = 15 marks]

Mark "X" in the most appropriate box.

1. The restriction endonuclease that can be used for insertional inactivation of ampicillin resistant gene of pBR322 is
[ ] ScaI [ ] HindIII [ ] BamHI [ ] SalI

2. In the following vector the selection of recombinants is a single step process.
[ ] pBR322 [ ] pUC8 [ ] pBR327 [ ] pBR328

3. The sixth codon of M13mp2 codes for
[ ] Serine [ ] Methionine [ ] Asparagine [ ] Aspartic acid

4. The restriction enzyme that cuts λEMBL4.
[ ] SfiI [ ] XbaII [ ] XhoI [ ] BamHI

5. The antibiotic selectable marker present is cosmid pJB8?
[ ] Kanamycin [ ] Penicillin [ ] Tetracycline [ ] Ampicillin

6. The enzyme that cuts the SUP4 selectable marker of yeast artificial chromosome.
[ ] EcoRI [ ] HindIII [ ] SnaBI [ ] AluI

7. Which of the following cannot be used as a vector
[ ] Bacteria [ ] Plasmid [ ] Phage [ ] 2μm circle

8. A method used to distinguish DNA of one individual from another individual is
[ ] Polymerase chain reaction [ ] DNA fingerprinting
[ ] Reverse transcription [ ] Random amplified polymorphic DNA

9. The left and right cohesive ends of λ DNA molecule is _____ nucleotides long
[ ] 9 [ ] 10 [ ] 11 [ ] 12

10. TOL plasmid is an example of
[ ] Fertility plasmid [ ] Resistance plasmid
[ ] Degradative plasmid [ ] Virulence plasmid

11. The enzyme derived from *E. coli* infected with T4 phage
[ ] Exonuclease III [ ] Terminal deoxynucleotidyl transferase
[ ] Polynucleotide kinase [ ] Alkaline phosphatase

12. In CTAB method for purification of plant DNA, the CTAB binds with
[ ] Protein [ ] Carbohydrate [ ] Nucleic acid [ ] Lipid

13. Taq DNA polymerase produces an overhang that is mainly made up of
[ ] Adenine [ ] Guanine [ ] Cytosine [ ] Thymine

14. The acid that is generally used for depurination step in Southern blotting is
[ ] Nitric acid [ ] Sulphuric acid [ ] Hydrochloric acid [ ] Carbonic acid

15. PCR technique that is used to preferentially amplify one strand of the original DNA more than the other.
[ ] Touchdown [ ] Multiplex [ ] Assymetric [ ] Nested

16. The A chain and B chain of insulin molecule is made up of _____ amino acids respectively.
[ ] 21 and 30 [ ] 30 and 21 [ ] 20 and 31 [ ] 31 and 20

17. The activity of normal polygalacturonase gene is high during _____ weeks.
[ ] 1-2 [ ] 3-4 [ ] 5-6 [ ] 7-8

18. The gene that alters high oleic acid content in soybean.
[ ] Polyphenol oxidase [ ] Starch synthase
[ ] Delta 12 desaturase [ ] Chalcone synthase

19. In attempts to confer special characteristics upon plants, genetic engineers find *Agrobacterium tumefaciens* to be an effective vector for use with
[ ] Corn [ ] Rice [ ] Soyabeans [ ] Wheat

20. The polymerase chain reaction was developed by
[ ] James Watson and Francis Crick [ ] Gregor Mendel
[ ] Kary Mullis [ ] Barbara McClintock

## SECTION "B"

[10 Q. × 0.5 = 5 marks]

Fill in the blanks:

21. DNA ligase used in genetic engineering is usually purified from *E.coli* infected with _____ phage.

22. In λ replacement vector the replaceable fragment is also referred as _____.

23. Insect virus used for the production of recombinant proteins is _____.

24. A collection of DNA fragments that make up the entire genome of a particular organism is called _____.

25. The integrated form of the phage DNA is called _____.

26. For using LEU2 as a selectable marker the host must be _____mutant.

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27. The method that is used to move systematically along a chromosome from a known location and to clone overlapping genomic clones that represent progressively longer parts of a particular chromosome is called _____.

28. The gel of sequencing reaction contains _____, which denatures the DNA so the newly synthesized strands dissociate from the templates.

29. For electron microscopy of nucleic acid it must be stained with electron-dense material like _____ to enhance the appearance of the preparation.

30. The promoter used for cloning antisense polygalacturonase gene is derived from _____.

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F. M. : 55

SECTION "C"
(Long answer questions)
[3 Q. × 7 = 21 marks]

Attempt *ANY THREE* questions:

1. What are plaques? Describe different methods used for the selection of recombinant plaques. [2+5]

2. What are the applications of recombinant DNA technology? How the assessment of cloning experiment of antisense polygalacturonase gene was done? [3+4]

3. Describe the structure of 2μm plasmid. What strategies are used for cloning genes in yeast artificial chromosome? [2+5]

4. What is host controlled restriction? A plasmid pTIL when cut with restriction enzyme A creates fragment of size 13,199 bp. The same plasmid when cleaved with enzyme B creates fragments of size 5,004 bp and 8,195 bp. Whereas, restriction with enzyme C produces fragments of 9,112 bp and 4,087 bp. Restriction digestion with all the three enzymes creates fragments of 1,236 bp, 2,433 bp, 2,571 bp, 2,872 and 4,087 bp. Construct a restriction map on the basis of the information provided. [2+5]

SECTION "D"
(Short answer questions)
[4 Q. × 3.5 = 14 marks]

5. Write short notes on (*ANY FOUR*):
   a. Homopolymer tailing
   b. Pedigree of pBR322
   c. Thermal cycle sequencing
   d. P-element as cloning vector
   e. Primer extension

SECTION "E"
[4 Q. × 2 = 8 marks]

6. Write down *TWO* differences between (*ANY FOUR*):
   a. Agarose gel and Polyacrylamide gel.
   b. Linkers and Adaptors.
   c. Single-strain *in vitro* packaging and Double-strain *in vitro* packaging.
   d. BAC's and PAC's.
   e. Binary vector strategy and Cointegration strategy.

## SECTION "F"

[4 Q. × 3 = 12 marks]

7. Give reasons why/ how? (*ANY FOUR*):
   a. Recombinant pUC8 produces white colonies.
   b. pBR322 is regarded as an artificial plasmid.
   c. Natural selection can be used to isolate modified λ phage that lacks certain restriction sites.
   d. Disarmed Ti cloning vectors are used in the production of transformed plants.
   e. In chemical degradation method of sequencing cloning into a M13 vector is not needed.