



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – BIOTECHNOLOGY

SECOND SEMESTER – APRIL 2017

16PBT2MC01- MOLECULAR BIOLOGY AND GENETIC ENGINEERING

Date: 19-04-2017
01:00-04:00

Dept. No.

Max. : 100 Marks

PART – A

Answer ALL the Questions

I. Choose the correct answer

(5x1 = 5 Marks)

- Which chemical is used for the transformation of *E. coli*?
a) CaCl₂ b) MgCl₂ c) NaCl d) KCl
- Among the following damages, which is the one associated with photoreactivation?
a) Double stranded breaks b) Damaged base
c) Pyrimidine dimers d) Replication errors
- The following about eukaryotic RNA polymerases are true EXCEPT
a) Found in nucleolus b) RNA Pol I synthesizes all types of RNA
c) They have easy access to template DNA d) Require many accessory factors to function
- The dideoxynucleotide differs from the deoxynucleotides at which position?
a) 2' b) 3' c) 2' and 3' d) 1' and 3'
- 'inner primers' and 'outer primers' are used in which technique given below.
a) Reverse transcription PCR b) Inverse PCR
c) Real time PCR d) Nested PCR

II. State whether the following are true or false, if false, give reason

(5x1=5 Marks)

- Single strand binding (SSB) protein is present in bacteria.
- Non homologs end joining (NHEJ) is used to repair double strand breaks in bacteria.
- In eukaryotes, Poly (A) tails help in protecting the mRNA.
- Northern Blotting is used to confirm the presence of gene of interest.
- The G+C content of primers in PCR is always greater than 50%.

III. Complete the following

(5x1= 5 Marks)

- Hfr stands for _____ strain.
- The cross structure formed after strand invasion by crossing of two DNA strands is _____.
- The cap is linked to the rest of the mRNA by a _____ linkage.
- Complementary 12bp overhang, found on each end of lambda phage genome is _____.
- _____ is a dye that binds only to double stranded nucleotides in qPCR.

IV. Answer the following within 50 words

(5x1 = 5 Marks)

- Define epigenetics.
- State the advantage of translesion synthesis.
- Give an example for a repressible operon.

20. Mention the role of *CEN* sequence in a shuttle vector.

19. What are degenerate primers?

PART B

Answer the following each within 500 words.

(5x8 = 40 marks)

Draw diagrams and flowcharts wherever necessary

20. (a) Why Mendel considered *Pisum sativum* as model plant?

OR

(b) Schematically show transformation, transduction and conjugation in bacteria.

21. (a) Illustrate the differences between A-DNA and B-DNA conformations.

OR

(b) Analyze the advantage of *Cre/Lox recombination* in creating type specific knockouts in mice.

22. (a) Enumerate the various post translational modifications and comment on glycosylation.

OR

(b) Critically evaluate the cAMP levels with lactose degradation in *E. coli*.

23. (a) List the various types of restriction enzymes. Compare Type I and II enzymes.

OR

(b) Develop a rapid hybridization method to isolate a colony containing a gene of interest.

24. (a) Employ a technique to quantify the mRNA using molecular beacons.

OR

(b) Mention the essential features to be considered during primer design.

PART – C

Answer any TWO of the following, each within 1500 words.

(2 x20 = 40 Marks)

Draw diagrams and flowcharts wherever necessary.

25. Describe semiconservative mode of replication in bacteria.

26. Elaborate any four DNA repair mechanisms in bacteria.

27. Classify cloning vectors and explain any four types with one example each.

30. Compare the classical Sanger's sequencing with any next generation Sequencing technology.

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