# P. P. SAVANI UNIVERSITY

**Fifth Semester of B.Sc. Examination**
**December-2021**
**SSBT3150–Recombinant DNA Technology-II**
**13.12.2021, Monday Time: 12:30 p.m. to 03:00 p.m. Maximum Marks: 60**

***Instructions:***
1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

**Section-I (Total Marks - 30)**

**Q.1 Short Questions** **[10]**

**1.1 Objectives** **[05]**

**1.1a** Which of the following cannot be studied using cDNA libraries
- **A** Alternative splicing
- **B** Regulatory regions of the genes
- **C** Gene function
- **D** All of the above

**1.1b** Which RNA is used for the construction of cDNA library
- **A** rRNA
- **B** tRNA
- **C** mRNA
- **D** sRNA

**1.1c** Reverse transcriptase catalyzes the conversion of
- **A** RNA to DNA
- **B** RNA to Protein
- **C** DNA to RNA
- **D** Protein to RNA

**1.1d** Southern blotting is used for
- **A** RNA hybridization
- **B** Protein hybridization
- **C** DNA hybridization
- **D** All of the above

**1.1e** Which of the following is/are ideal vector for large inserts
- **A** Cosmids
- **B** λ phages
- **C** BACs
- **D** All of the above

**1.1f** Which of the enzyme is used for Nick Translation
- **A** Klenow Fragment
- **B** DNA Pol I
- **C** Reverse Transcriptase
- **D** Topoisomerase

**1.1g** In blue white screening, BLUE colonies reflect

A Transformed and recombinant cells
B Untransformed and recombinant
C Transformed but non-recombinant cells
D Untransformed and non-recombinant

**1.1h** Diethyl pyrocarbonate, is used during RNA extraction to:

A extract protein
B inhibit RNAase
C degrade the cell wall
D sepearte RNA from the mixture

**1.1i** During Phenol-chloroform extraction, If pH is acidic (4.0)

A RNA will stay in aqueous phase and DNA will be in organic phase
B RNA will stay in organic phase and DNA will be in aqueous phase
C RNA will stay in the interphase and DNA will be in aqueous phase
D None of the options are correct

**1.1j** **During RNA extraction, _____degrades proteins and inhibit RNAses**

A Guanidium thiocynate
B Phenol- Chloroform
C Isopropanol
D All the options are correct

**1.2 Answer the Following: (MCQ/Short Question/Fill in the Blanks)** [05]

**1.2a** YAC stands for_____

**1.2b** During cDNA synthesis, _____ enzyme is used to cut the loop of dsDNA at one end

**1.2c** In RNA extraction, 70 % ethanol is added for removing the salts (T/F)

**1.2d** For genomic library construction and screening, a small genome will require fewer clones than a more complex one (T/F)

**1.2e** λ gt10 has LacZ' for visual screening (T/F)

**Q.2 Short Notes (Attempt any two)** [06]

A Spi- mutant
B Clarke and Carbon probability formula
C Screening a cDNA library with a labeled oligonucleotide probe based on a known peptide sequence

**Q.3 Explain in detail (Attempt any two)** [14]

A Discuss different strategies to prepare Genomic library?
B Describe different methods of radioactive and non-radioactive probe labelling?
C What is Colony Hybridization? Explain each step-in detail

## Section-II (Total Marks - 30)

**Q.1 Short Questions** [10]

**1.1 Objectives** [05]

**1.1a** In a given genome, the average spacing between HindIII sites (six-base-long HindIII sequence) is approximately_____

A 0.25 Kb
B 4Kb
C 8 Kb
D 6 Kb

**1.1b** While cloning in EMBL4 vector, which of the following site in a recombinant genome are cut to be packaged into phage heads

A Right arm
B Cos site
C Left arm
D All of the above

**1.1c** Which component of the bacterial system facilitates the screening of recombinant clones?

A Promoter
B Selection marker
C Origin of replication
D Multiple Cloning Site

**1.1d** A vector digested with Sau3A enzyme can be ligated to an insert digested with_____

A EcoRI
B XbaI
C BamHI
D HindIII

**1.1e** In Blue-White screening, after transformation, recombinants are screened by plating onto:

A agar containing only X-gal
B agar containing only IPTG
C agar containing both X-gal and IPTG
D None of the above

**1.1f** In Nick translation, radioactive probes are labelled:

A with $P^{31}$
B with $P^{35}$
C with $P^{32}$
D with $P^{33}$

**1.1g** P1-derived artificial chromosome, or PAC, is a DNA construct derived from the _____

A DNA of P1 bacteriophages and Bacterial artificial chromosome
B DNA of λ bacteriophages and Bacterial artificial chromosome
C DNA of λ bacteriophages and Yeast artificial chromosome
D DNA of P1 bacteriophages and Yeast artificial chromosome

**1.1h** During end labelling, _____ enzyme treatment of probe is done to

remove 5' phosphate

A Alkaline phosphatase
B Polynucleotide kinase
C DNase I
D Klenow fragment

**1.1i** Which of the following was the first widely adopted method for DNA sequencing

A Sanger
B Maxam-Gilbert
C Ion-torent
D Solexa

**1.1j** Ion Torrent sequencing measures the _____from the incorporation of individual bases by DNA polymerase

A Indirect release of H+
B Indirect release of nitrogenous base
C direct release of nitrogenous base
D direct release of H+

**1.2 Answer the Following: (MCQ/Short Question/Fill in the Blanks)** **[05]**

**1.2a** In Blue-White screening when insert is inserted within the lac Z region, it produces blue colonies (True/ False)

**1.2b** Insertional inactivation of cI gene produces turbid plaques (Ture/False)

**1.2c** Anti-digoxigenin antibodies with high affinities and specificity are used in a variety of biological immuno-assays (Ture/False)

**1.2d** _____is a method to detect a polypeptide produced from a cloned gene

**1.2e** Define BACs

**Q.2 Short Notes (Attempt any two)** **[06]**

A Nick translation
B Maxam Gilbert sequencing
C Ion torrent sequencing

**Q.3 Explain in detail (Attempt any two)** **[14]**

A What is NGS? Describe Solexa (Illumina) sequencing in detail.
B Describe Immunoscreening technique in detail.
C What is Sanger sequencing? How is Sanger Sequencing different from Maxam Gilbert sequencing?