T.Y.BSc Sem V

Subject: Biochemistry : Paper III - Advanced Genetic and RDS. 2016-17

QP Code : 77085

(2 ½ Hours) [Total Marks :75

N.B. : (1) All the questions are compulsory. Choice is internal.
(2) Figures to the right indicate full marks.
(3) All questions carry equal marks.
(4) Draw flowcharts / diagrams wherever necessary.

1. (A) Choose the MOST appropriate option (Any Three) 3

(i) Why is an RNA primer necessary for DNA replication?
- (a) RNA primer is necessary for the activity of DNA ligase
- (b) RNA primer creates the 5' and 3' ends of the strand
- (c) DNA polymerase can only add nucleotides to RNA molecules

(ii) If a mutation occurs in a cell such that normal Okazaki fragments were created during DNA replication but were not linked together into a continuous strand, the gene for _____enzyme could have been altered by this mutation.
- (a) DNA polymerase
- (b) helicase
- (c) ligase

(iii) DNA replication is said to be semiconservative because _____
- (a) both RNA and DNA synthesis are involved in the process
- (b) a new double helix contains one old and one new strand
- (c) each new strand is complementary, not identical, to its template

(iv) The type of mutation most commonly associated with exposure to UV light is _____.
- (a) thymine dimerization
- (b) base deamination
- (c) depurinization

(v) Kornberg enzyme is a term used to depict DNA Polymerase ___ .
(a) I (b) II (c) III

(vi) Primosome does not contain _____.
- (a) DNA Polymerase
- (b) RNA Polymerase
- (c) initiator protein

[TURN OVER]

1. (B) Respond in brief to **any one**: 2
   (i) Give the role of alkyl transferase.
   (ii) Enlist the requirements for DNA replication.

   (C) Answer the following **any one:** 4
   (i) Explain the mending of DNA by mismatch repair mechanism
   (ii) Pioneering experiments were conducted to explain the model of DNA replication. Elaborate on the same.

   (D) Attempt **any two:** 6
   (i) Discuss excision repair
   (ii) Explain the mechanism of DNA replication in prokaryotes

2. (A) Choose the MOST appropriate option (**Any Three**) 3
   (i) What is true regarding RNA processing?
      (a) Involves removal of exons
      (b) Involves removal of one or more introns
      (c) Occurs in prokaryotes

   (ii) Genetic code is degenerate, means _____
      (a) RNA is rapidly degraded
      (b) code is not universal among organisms
      (c) some amino acids have more than one codon

   (iii) The _____ strand of DNA has similarity with RNA nucleotide sequence except for difference between T and U.
      (a) non-template (b) non-coding (c) template

   (iv) Alternate splicing is a characteristic feature of_____
      (a) *E. Coli* (b) yeast (c) humans

   (v) Shine-Dalgarno sequence is present on _____.
      (a) mRNA (b) rRNA (c) ribosome

   (vi) Recycling of EF- Tu, involved in translation requires_____
      (a) EF-Ts (b) EF-G (c) EF Tg

2. (B) Answer in brief **any one** : 2
   (i) Which process of the Central Dogma does Rifampicin and Puromycin affect and how?
   (ii) Define: Polycistronic

2. (C) Write short notes on **any one** of the following: 4
   (i) Charging of tRNA (ii) Splicing

2 (D) Answer in detail **any two**:
   (i) Elaborate on mechanism of transcription. 6
   (ii) Discuss post-translational modifications in detail

3. (A) Choose the MOST appropriate option (**Any Three**): 3
   (i) _____enzyme leads to split of sugar phosphate bonds
      (a) Esterase
      (b) Restriction enzyme
      (c) Polymerase

   (ii) pUC contains gene for _____ resistance.
      (a) penicillin (b) ampicilin (c) streptomycin

   (iii) Terminal transferases catalyses addition of nucleotides to _____.
      (a) 3' terminus of DNA
      (b) 5' terminus of RNA
      (c) 3' terminus of RNA

   (iv) Type _____restriction enzymes cut at a site that differs, and is around 1000 bp away from their recognition site.
      (a) I (b) II (c) III

   (iv) BAC is a preferred _____ vector.
      (a) cloning
      (b) shuttle
      (c) recombinant

   (v) Reverse Transcriptase is used for synthesis of _____.
      (a) DNA from RNA
      (b) RNA from DNA
      (c) RNA from protein

(B) Answer in brief **any one**: 2
   (i) Enlist two characteristics of an ideal plasmid
   (ii) Define: Cosmid

(C) Answer **any one** of the following: 4

(i) Describe how RDT has revolutionized medicine.

(ii) Write a short note on: Probes

(D) Attempt **any one:** 6

(i) A variety of cloning vectors are available each with specific characteristics. Elaborate on the above statement.

(ii) Elaborate on restriction endonucleases.

4. (A) Choose the MOST appropriate option: (**Any Three**) 3

(i) Which of the following libraries would be expected to be essentially the same?

(a) Genomic libraries made from mouse liver and kidney cells

(b) cDNA libraries made from mouse liver and kidney cells

(c) Genomic and cDNA libraries made from mouse liver cells

(ii) $CaCl_2$ helps in _____

(a) transformation

(b) PCR

(c) microinjection

(iii) Transformed cells in presence of X-gal give _____ coloured colonies.

(a) white (b) blue (c) clear

(iv) Kary Mullis discovered _____technique.

(a) Electrophoresis (b) PCR (c) Southern blotting

(v) Gene gun technique helps to overcome the problem of _____

(a) Complex structure of animal cell

(b) strong cell wall of plant cell

(c) peptidoglycan cell wall of bacteria

(vi) _____ is often used to describe virus-mediated gene transfer into eukaryotic cells.

(a) Transformation

(b) Transfection

(c) Transduction

[TURN OVER]

(B) Define / Explain the terms **any one:** 2
(i) Electroporation (ii) RT-PCR

(C) Write short notes on **any one:** 4
(i) Use of antibiotics for selection and screening
(ii) Gene library

(D) Elaborate on **any one:** 6
(i) RDT requires cell amplification for effective results. Discuss a procedure of carrying out the same.
(ii) Discuss the technique of Southem blotting

5. (A) Answer **any one:** 3
(i) Why is SOS repair error prone?
(ii) Justify: Replication is semi-discontinous.

(B) Write brief notes on **any one:** 3
(i) Modifications of tRNA
(ii) Termination of translation

(C) Attempt **any one:** 3
(i) What is role of reverse transcriptase in recombinant DNA technology?
(ii) Write a note on BAC.

(D) Write a brief note **any one:** 3
(i) Microinjection
(ii) Chimeric DNA

(E) State true or false (**Any Three**): 3
(i) YAC exhibits the lytic and the lysogenic phases in their life cycle
(ii) A DNA fork is bidirectional in nature.
(iii) The C end of a protein is synthesized first followed by the N end.
(iv) Eco RI produces blunt ends.
(v) c-DNA library contains spliced RNA.
(vi) Sigma factor is involved in termination of translation.
