



- ii) What is added to the 3'-end of many eukaryotic *mRNAs* after transcription ?
- a) introns
 - b) a poly A tail
 - c) a cap structure, consisting of a modified G nucleotide
 - d) the trinucleotide 5'-CCA.
- iii) Which of the following tools of recombinant DNA technology is *incorrectly* paired with one of its uses ?
- a) restriction endonuclease — production of DNA fragments for gene cloning
 - b) DNA ligase — enzyme that cuts DNA, creating sticky ends
 - c) DNA polymerase — copies DNA sequences in the polymerase chain reaction
 - d) reverse transcriptase — production of cDNA from *mRNA*.
- iv) Which of the following is *not* a feature of eukaryotic gene expression ?
- a) many genes are interrupted by noncoding DNA sequences
 - b) RNA synthesis and protein synthesis are coupled as in prokaryotes
 - c) *mRNA* is often extensively modified before translation
 - d) multiple copies of nuclear genes and pseudogenes can occur.



- v) The "Southern" technique involves
- the detection of DNA fragments on membranes by a radioactive DNA probe
 - the detection of proteins on membranes by using a radioactive DNA probe
 - the detection of proteins on membranes by using specific radioactive antibodies
 - the detection of DNA fragments on membranes by specific radioactive antibodies.
- vi) The primary RNA transcript of the chicken ovalbumin gene is 7700 nucleotides long, but the mature *mRNA* that is translated on the ribosome is 1872 nucleotides long. This size difference occurs primarily as a result of
- splicing
 - cleavage of polycistronic *mRNA*
 - removal of poly A tails
 - reverse transcription.
- vii) For transcription to occur in the lactose operon, an inducer must be present so that
- the repressor can bind to the operator
 - the repressor does not bind to the operator
 - the inducer can bind to the operator
 - the inducer does not bind to the operator.



- viii) In the lactose operon, what is the function of *lac Z* gene product ?
- a) binds to an inducer
 - b) binds to the *lac* operator
 - c) binds to the *lac* promoter
 - d) splits lactose into glucose and galactose.
- ix) "Gene library" is a term used to describe
- a) a computerized listing of known DNA sequences
 - b) bacteria with plasmids containing DNA fragments representing the majority of the genetic information from a plant or animal
 - c) a store that specializes in the sale of Levis
 - d) a compilation of the amino acid sequences of protein coding genes.
- x) One of the most significant discoveries which allowed the development of recombinant DNA technology was
- a) the discovery of antibiotics used for selecting transformed bacteria
 - b) the identification and isolation of restriction endonucleases permitting specific DNA cutting
 - c) the discovery of DNA and RNA polymerase allowing workers to synthesize any DNA sequence
 - d) the southern technique for separation and identification of DNA sequences.



- xi) Which of the following is not part of the normal process of cloning recombinant DNA in bacteria ?
- Restriction endonuclease digestion of cellular and plasmid DNAs
 - Separation of recombinant DNAs by electrophoresis using the southern technique to determine where the desired recombinant migrates
 - Transformation of bacteria by the recombinant DNA plasmids and selection using ampicillin
 - Probing blots of bacteria clones with radioactive DNA complementary to desired gene.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

- What is insertional inactivation ? Explain with an example. $2 + 3$
- What is Wobble hypothesis ? How does it explain the ease of interaction between *mRNA* and *tRNA* ? Which amino acid except methionine has only one genetic code ? $4 + 1$
- Which vector is best suited for cloning a fragment of 40 Kbp ? Describe the function of *dam* methylase. $1 + 4$
- Discuss the synthesis of aminoacyl *tRNA*. State the differences between genomic DNA library & cDNA library. $2 + 3$
- What is the role of *Ara C* protein as repressor and activator of arabinose operon ? 5



GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) What are – 10 and – 35 sequences ?
- b) Define the role of Σ (sigma) factor in transcription.
- c) Describe rho dependent termination in transcription.
- d) Describe the mode of function of rifampicin and tetracycline. $2 + 2 + 2 + 4 + 2\frac{1}{2} + 2\frac{1}{2}$
8. a) What is a polycistronic *mRNA* ?
- b) Describe the different types of 5' cap structures of *mRNA*.
- c) Explain with diagram how a cDNA library has been constructed.
- d) What are *cis* acting and *trans* acting elements ? $1 + 4 + 6 + 2 + 2$
9. a) In prokaryotes, transcription and translation are coupled process. Explain.
- b) State the mechanism of recycling of EF-Tu during bacterial protein synthesis.



- c) What are HRE ?
- d) Where are the receptors for steroid hormones and nonsteroid hormones found in a cell ?
- e) How has Human Genome project been helpful to mankind ? $2 + 4 + 2\frac{1}{2} + 2\frac{1}{2} + 4$
10. a) Write short notes on the following :
- i) Alpha complementation
 - ii) Cloverleaf structure of *t*RNA
- b) Describe the process of production of recombinant human insulin in *E.coli*.
- c) State the function of polynucleotide kinase in *r*DNA technology. $(2 \times 4) + 5 + 2$
11. a) Explain antisense RNA technology with example.
- b) What is ribozyme ? How are they used in gene therapy ?
- c) Describe the procedure for generating a mutant by site directed mutagenesis. $5 + 5 + 5$
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