八十四學年度 生物醫學 所 組碩士班研究生入學考試

科目 分子生物學 科號 1103 共 3 頁第 1 頁 *請在試卷【答案卷】內作答

Part I. (50%)

1. a) Design a conventional protocol to prepare a genomic library.
   b) How do you isolate a particular gene from this genomic library? (10 points)

2. You have provided a cDNA of gene X, and a vector containing a strong *E. coli* promoter as shown in Fig. 1. How do you prepare a high-level protein of gene X from *E. coli*? (10 points)

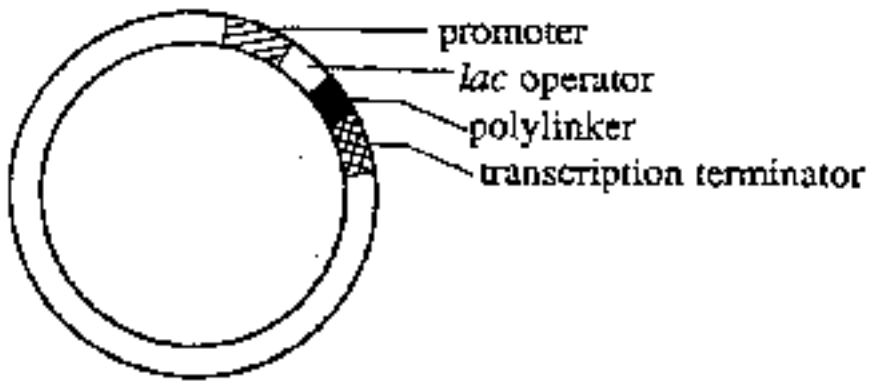

Fig. 1

3. Describe the molecular mechanisms to generate immune diversity of immunoglobulin genes. (10 points)

4. Brief describes the protein functions of the following proto-oncogenes. (10 points)
   a) *ras* b) *erb*B c) *sis* d) *myc* e) *raf*

5. Define adequately (10 points)
   a) alternative RNA splicing
   b) RNA editing
   c) nick translation
   d) processed pseudogene
   e) cyclins

Part II. (50%)

Section I. True or not true, if not true, explain it. (15%)

1. The role of a gene in a metabolic pathway is inhibitory because the pathway progression is enhanced when the gene is knocked-out.

2. Reverse transcriptase transcribes its template to give antisense RNA.

3. Expression in transient expression experiment is only in short period of time because the transfected DNA does not enter nuclei of cells.

4. Specificity of sequence recognition in transcription factors is determined by both DNA and transactivation domains.

5. pYAC is a shuttle vector because it contains both bacterial and yeast origin of replication (YAC: yeast artificial chromosome).

Section II. Short assay (35%)

1. A phenotype in yeast is lost and mutation of YFG gene is found. When the intact YFG gene is successfully introduced to yeast, the phenotype is, however, not restored. explain why. (5%)

2. Mutation in either repressor gene or operator sequence in *E.coli lac* operon may result in constitutive expression of the operon. Please use a genetic method to distinguish these two mutants.(10%)

3.Professor Liu claimed that he had discovered a new defective transposable DNA sequence in maize (i.e. corn). What evidence(s) would he have to show? (10%)

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4. The following figure shows RFLP linkage analysis for X disease. Persons in the family affected by the disease were represented in the dark. Please (1) deduce the haplotype of the affected grandparent, I-1; (2) predict whether the grandchild, III-1 is affected by the X disease or not.(10%)