2017

ZOOLOGY

Paper : 402 (Old)

MOLECULAR BIOLOGY, GENOME ORGANIZATION AND MOLECULAR TECHNIQUES

Full Marks: 80

Time: 3 hours

The figures in the margin indicate full marks for the questions

1. Answer the following objective type of questions (any eight) **1 x 8 = 8**

a) Regarding DNA replication in Eukaryotes which one of the following is TRUE?

i) DNA replication in eukaryotes is always conservative in nature

ii) Initiation of DNA replication starts at 9-mer and 13-mer sequence

iii) Primer required during replication is synthesized by Pol-α/primase

iv) RNA primer removal is done by Polymerase-I enzyme

b) Which one of the following histone protein is NOT found in beads-on-a-string structure of chromatin?

i) H3 iii) H4

ii) H2A iv) H1

c) What type of DNA damage will takes place when exposed to UV-radiation?

i) Pyrimidine dimer iii) Purine dimer

ii)Deaminated bases iv) Hydroxylated bases

d) Which one of the following is INCORRECT regarding the RNA polymerases in Prokaryotes?

i) RNA polymerase contains five subunits

ii) Three RNA polymerase are present in prokaryotes

iii) Sigma factor recognize the promoter

iv) Beta subunit of RNA polymerase enzyme is the biggest subunit

e) Which one of the following is NOT translation termination codon?

i) UAG iii) UGA

ii) AGU iv) UAA

f) Which is the incorrect sequence of transcription initiator region in higher eukaryotes?

i) Enhancer → promoter → start site

ii) Enhancer → proximal promoter → core promoter → start site

iii) Enhancer → CAT box → GC box → TATA box → start site

iv) Enhancer → GC box → CAT box → Hogness box → start site

g) All of the following is true regarding post-transcriptional modifications in eukaryotes, except

i) 5'-Capping takes place by the addition of 5-methylated guanosine molecule

ii) Addition of large number of adenosine at the 3'-end by Poly-A polymerase

iii) Extra methylation may takes place at 2'-positions of ribose sugar in 1st and 2nd nucleotides

iv) Most introns have consensus sequence ending with 5'-GU....AG-3'

h) According to Wobble hypothesis which one of the following statement is INCORRECT?

i) Wobble hypothesis mainly emphasizes on the nucleotide sequences of anticodons

ii) First two bases of codon forms strong W/C base pairs with anticodon while 3rd base do not form

iii) Same anticodons can sometimes recognize more than single codon

iv) Whether an anticodon recognize one or more codons solely depends on the 3rd base of anticodon

i) Which is INCORRECT statement regarding GU—AG intron splicing mechanism?

i) 5-splice and 3-splice sites are also called donor and receptor sites

ii) Initially U1 snRNP protein binds to 3-branch site

iii) Two transesterification reactions occurs in complete splicing process

iv) Lariat formation occurs after the first transesterification reaction

2. Answer the following short type of questions (any five) **2 x 5 = 10**

a) Why primer is required during DNA replication?

b) What is photoreactivation?

c) Write four differences between Pro-and Eukaryotic transcription?

d) What do you mean by proofreading activity of DNA replication?

e) Why do you think RNA is unstable than DNA?

f) Draw the structure of tRNA with proper labeling.

3. Answer the following long type of questions (any four) **5 x 4 = 20**

a) Write short notes on conservative, semiconservative mode of DNA replication.

b) Write short notes on Genetic code.

c) Write briefly about the post-transcriptional gene silencing.

d) Write short notes on mitochondrial genome organization.

e) Write short notes on replication initiation in Bacteria.

4. Answer the following very long type of questions (any two) **9 x 2 = 18**

a) What is recombination? Describe the site specific recombination. 2+7

b) Describe the mechanism of transcription initiation and termination in prokaryotes. 9

c) What is post-transcriptional processing? Describe the process of intron splicing with suitable diagram. 2+7

5. Answer the following descriptive type of questions (any two) **12 x 2 = 24**

a) What is transcriptional gene control? Explain how bacteria sustain in a glucose deficit medium. 2+10

b) What is gene complexity? Describe in detail the genome organization in eukaryotes up to 30 nm with labeled diagram. 2+10

What is mismatch DNA error? Describe the mechanism of nucleotide excision repair mechanism with suitable diagram. 2+10

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