RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. THIRD SEMESTER EXAMINATION, DECEMBER 2019

SECOND YEAR [BATCH 2018-21]

Date : 13/12/2019 **ZOOLOGY [Honours]**

Time : 11 am - 1 pm **Paper : III (Gr. B)** Full Marks : 50

1. Answer **any five** questions of the following : [5×2]

   a) What is 'guide RNA'?

   b) Write down the mechanistic difference between the topoisomerase I & II.

   c) What is site specific recombination?

   d) What is 'Promoter Efficiency'?

   e) What is Cooley's anemia?

   f) What is an 'Open Reading Frame'?

   g) What is Lyonization?

   h) Define antisense oligonucleotide.

2. Answer **any four** questions of the following : [4×10]

   a) State the crucial step in the Avery, McLeod and McCarty's experiment by which it was proved that DNA is the genetic material.

   Define linking, twist and writhing numbers in the context of superhelicity of DNA.

   What do you mean by Licensing factor in replication?

   Mention the structural features of B-DNA which made it very much flexible. [2+3+2+3]

   b) In Meselson-Stahl's experiment the intermediate DNA band in caesium chloride gradient may be the result of semi-conservative or dispersive mode of replication. How did these scientists rule out the possibility of dispersive mode of replication?

   Why is DNA polymerase unable to replicate telomeric DNA. Name the enzyme which does this function.

   Write the structural and functional differences between DNA polymerase I & II.

   Briefly mention the process of initiation of DNA replication in *Escherichia coli*. [2+2+1+2+3]

   c) Mention major 'hallmarks' present in any form of cancer.

   What is tumor-suppressor gene?

   'Cell cycle check points are the important attributes in cancer biology' — Justify.

   Describe the steps involved in a successful metastasis to occur. [3+2+3+2]

d) Give an account on transposition of virus-like retrotransposons.

Briefly explain the genetic organization of a typical LINE & SINE.

Define Genomic imprinting .

'Angelmann Syndrome and Prader Willie Syndrome are the best examples of Genomic imprinting through epigenetic regulation' — justify the statement. [2+2+2+4]

e) How does base flipping cause the separation of template and non-template strands in *E. coli*.? State how the 'Termination Hairpin' is formed with a figure.

How does TFIID form preinitiation complex in Yeast?

Mention two important features of Helix-turn-Helix motif.

Define Spliceosome. [2+(1+1)+2+2+2]

f) Explain the attenuation mechanism involved in *trp* Operon regulation.

Explain 'Glucose effect' and its role in the regulation of *lac* Operon.

Explain how gene expression of *lacZ* and *lacY* genes will be regulated in the presence/absence of Lactose (inducer) for the following genotype: $I^s P^+ O^+ Z^+ Y^+ / I^+ P^+ O^c Z^+ Y^+$ [3+3+4]

g) What are gene silencers?

Elucidate the overall chain reaction involved in the initiation steps of translation.

Briefly discuss the 'Holliday model' of tRNA. [2+5+3]

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