Reg. No.										

INTERNATIONAL CENTRE FOR APPLIED SCIENCES

(Manipal University)

IV SEMESTER B.S. DEGREE EXAMINATION – MAY 2016

SUBJECT: CELL AND MOLECULAR BIOLOGY (BT 242)

(BRANCH: IND. BIOTECH.)

27TH MAY, 2016

Time: 3 Hours **Max. Marks: 100**

- ✓ **Answer ANY FIVE full Questions.**
- ✓ **Draw diagrams wherever necessary.**

1A. Elaborate the two key features of meiosis that contribute to genetic variations?

1B. Describe the internal architecture of the eukaryotic nucleus.

1C. Explain how chromatin structure influences genome expression.

(4+8+8=20 marks)

2A. Describe the various stages of cell cycle.

2B. How do cohesins and condensins bring about chromosome condensation?

(10+10=20 marks)

3A. Describe the basic features of a mitotic spindle.

3B. Elaborate on kinesins and dynenins.

(10+10=20 marks)

4A. You have purified a virus that infects turnip leaves. Treatment of a sample with phenol removes viral proteins. Application of the residual material to scraped leaves results in the formation of progeny virus particles. You infer that the infectious substance is a nucleic acid. Propose a simple and highly sensitive means of determining whether the infectious nucleic acid is DNA or RNA.

4B. A mutant Tetrahymena has an altered repeated sequence in its telomeric DNA. What change in the telomerase enzyme would produce this phenotype?

4C. What are G-protein coupled receptors?

(6+6+8=20 marls)

5A. Hershey and Chase showed that when phages were labeled with ^{32}P and ^{35}S, the ^{35}S remained outside the cell and could be removed without affecting the course of infection, whereas the ^{32}P entered the cell and could be recovered in progeny phages. What distribution of isotopes would you expect to see if parental phages were labeled with isotopes of

a) C? b) N? c) H?

Explain your answer.

5B. Assume that a gene lost a nucleotide pair from the middle of its coding sequence. What affect will this have on the resulting polypeptide?

5C. Can RNA have a B-type double helix? Justify your answer.

(6+8+6=20 marks)

6A. Explain what is meant by alternative splicing?

6B. What are base analogs? Explain with an example how they give rise to mutations?

(10+10=20 marks)

7A. What was the reason behind using ^{35}S in the Hershey-Chase experiment? What was concluded from this experiment?

7B. What is meant by site-directed mutagenesis?

(10+10=20 marks)

8A. When researchers design drugs that must enter cells to be effective; they sometimes add methyl (CH3) groups all over the outer surface to make the drug molecules more likely to pass through cell membranes. Conversely, when researchers design drugs that act on the exterior of cell membranes, they sometimes add a charged group to decrease the likelihood that the drugs will pass through membranes and enter cells. Explain why these strategies make sense.

8B. If the GC content of a DNA molecule is 68%, what are the percentages of each of the four nucleotides?

8C. Discuss any 2 post-translational modifications.

(8+4+8=20 marks)