Reg. No. | | | | | | | | | | |

MANIPAL INSTITUTE OF TECHNOLOGY

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III SEMESTER B.TECH. (BIOTECHNOLOGY)

END SEMESTER EXAMINATIONS, NOV/DEC 2018

SUBJECT: CELL AND MOLECULAR BIOLOGY [BIO 2101]

REVISED CREDIT SYSTEM

Time: 3 Hours | MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A.	It has been found that diseases associated with mitochondrial DNA can be inherited. Why is it difficult to treat diseases that arise from faulty mitochondria and what are the ways by which such diseases can be treated?	4M
1B.	What is the significance of proper chromosome condensation during mitosis? Elaborate on the proteins involved in chromosome condensation.	3M
1C.	Stem cells can divide symmetrically, asymmetrically or in both the ways?	3M
2A.	Green fluorescent protein (GFP) gene present in jellyfishes gives them the ability to glow under certain conditions. Using which procedure can you transfer GFP gene to a bacteria and make them glow?	4M
2B.	How does transfer of genetic material take place by conjugation?	3M
2C.	The first mammal to be cloned from an adult cell was the sheep Dolly. To create Dolly, a mature cell from the mammary gland of one sheep was fused with the oocyte (egg cell) from another, from which oocyte the nucleus had previously been removed. The result of this fusion was a cell with the vigor and potential of an oocyte but a genetic constitution determined by the nucleus of the mammary-gland cell. This cell eventually grew into Dolly - a sheep whose nuclear DNA was cloned from a single mammary-gland cell. Compare the genetic material of cells of Dolly and the cells of the sheep whose DNA was cloned. Are these genetic materials same or different? Justify your answer.	3M

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3A.	Different proteins need to be sent to different parts of a eukaryotic cell, or, in some cases, exported out of the cell and into the extracellular space. How does this take place?	4M
3B.	How do proteins move between different compartments?	3M
3C.	What are CpG islands and what is their significance?	3M
4A.	Elaborate how the following two DNA elements influence the transcriptional process. i) Enhancers and ii) Promoters	4M
4B.	Normally translation requires the presence of 5' cap. Is there a possibility for cap-independent translation?	3M
4C.	During an siRNA experiment there was no change in phenotype but a change in total protein amounts was detected between cells treated with siRNAs and those untreated. What could be the possible reason for this observation?	3M
5A.	Human genome comprises approximately 25,000 genes but the human proteome comprises more than a million protein. How is this achieved?	4M
5B.	Some human fibroblast cells were cultured at 37°C and were then exposed to 45°C for a brief period. Due to this treatment, will the chaperones be upregulated or downregulated? Justify your answer.	3M
5C.	State one application of cells having temperature-sensitive mutation?	3M