Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

III SEMESTER B.TECH (BIOTECHNOLOGY)

MAKEUP EXAMINATIONS, DEC 2015/JAN 2016

SUBJECT: CELL AND MOLECULAR BIOLOGY [BIO 202]

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** the questions.
- Missing data may be suitable assumed.

1A.	Would you expect to see more or less acetylation in regions of DNA that are sensitive to digestion by DNase I? Why?	**4M**
1B.	A plant breeder wants to isolate mutants in tomatoes that are defective in DNA repair. However, this breeder does not have the expertise or equipment to study enzymes in DNA repair systems. How could the breeder identify tomato plants that are deficient in DNA repair? What are the traits to look for?	**3M**
1C.	The carbohydrates attached to some proteins and lipids of the plasma membrane are added as the membrane is made and refined in the ER and Golgi apparatus. The new membrane then forms transport vesicles that travel to the cell surface. On which side of the vesicle membrane are the carbohydrates?	**3M**
2A.	In the 1920s, while working with *Streptococcus pneumonia* (the agent that causes pneumonia), Griffith injected mice with different types bacteria. For each of the following bacteria types injected, state with reason whether the mice lived or died: a) type IIR b) type IIIS c) heat-killed IIIS d) type IIR + heat-killed IIIS	**4M**
2B.	How can a target cell's response to a hormone be amplified more than a millionfold? Explain with an example.	**3M**
2C.	The results of several studies provide evidence that DNA repair is rapid in genes that are undergoing transcription and that some proteins that play a role in transcription also participate in DNA repair. How are transcription and DNA repair related? Why might a gene that is being transcribed be repaired faster than a gene that is not being transcribed?	**3M**
3A.	Compare the following two events in terms of their potential consequences. In event 1, an incorrect nucleotide is inserted into the new DNA strand during replication and is not corrected by the proofreading or repair systems before the next replication. In event 2, an incorrect nucleotide is inserted into an mRNA during transcription.	**4M**

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3B.	A space probe returns from Jupiter and brings with it a new microorganism for study. It has double-stranded DNA as its genetic material. However, studies of replication of the alien DNA reveal that, although the process is semiconservative, DNA synthesis is continuous on both the leading- strand and the lagging-strand templates. What conclusions can you draw from this result?	**3M**
3C.	Describe the binding of RNA polymerase, repressors and activators to the lac operon when both lactose and glucose are scarce. What is the effect of these scarcities on transcription of the lac operon?	**3M**
4A.	Describe the molecular action of the enzyme DNA ligase. What properties would you expect an *E.coli* cell to have if it had a temperature-sensitive mutation in the gene for DNA ligase?	**4M**
4B.	What is the function of the TATA box in eukaryotic promoters?	**3M**
4C.	mRNA processing in eukaryotes involves what 3 sequential steps?	**3M**
5A.	Mitotic spindle is a microtubule based machine. State the basic features of a mitotic spindle.	**4M**
5B.	Glycosylation of proteins in the endoplasmic reticulum serves what function?	**3M**
5C.	Describe in steps how the double helix of DNA, which is 2 nm in width, gives rise to a chromosome that is 700 nm in width.	**3M**
6A.	What differences are found in the initiation of protein synthesis between prokaryotes and eukaryotes? What differences are found in the termination of protein synthesis between prokaryotes and eukaryotes?	**5M**
6B.	State 3 ways in which bacteria can acquire genetic diversity.	**5M**