Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

I SEMESTER M.TECH (INDUSTRIAL BIOTECHNOLOGY)

END SEMESTER EXAMINATIONS, NOV 2015

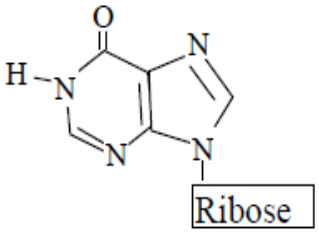
SUBJECT: MOLECULARBIOLOGY AND rDNA TECHNOLOGY [BIO503]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A.	IMP (inosine monophosphate) is present in E. coli as an intermediate of biosynthesis of purines and it is possible to incorporate IMP to DNA if the ITP (inosine triphsophate) is present in the reaction medium. However, in nature, IMP is never present in DNA. Propose an explanation. 	**3**
1B.	Why a circular double stranded DNA renature more rapidly than a linear double stranded DNA? Explain why, RNA, and not DNA, is hydrolyzed under basic pH conditions.	**3**
1C.	AIDS is caused by a virus (HIV) that contains single-stranded RNA as its genetic material. Explain its replication mechanism. Which virus enzyme would u choose as a drug target?	**4**
2A.	Discuss the molecular cascade of mRNA processing in eukaryotes.	**4**
2B.	What would the result be if an adenine underwent a tautomeric shift as the DNA molecule was being replicated? Also classify and term the following mutations: **(i)** A→T **(ii)** C→T **(iii)** AGA→UGA **(iv)** AGA→CGA and **(v)** AGA→AAA.	**3**
2C.	Unlike DNA polymerase, RNA polymerase does not proofread and edit its products. Why does this absence of proofreading/correction in the synthesis of RNA not threaten the cells' viability?	**3**
3A.	How do the roles of ATP and GTP differ in translation?	**4**
3B.	Even before the genetic code was elucidated, it was hypothesized that the simplest genetic code would be a triplet code. What was the rationale for this hypothesis?	**3**
3C.	How does TATA box binding protein identifies "TATA" DNA pattern?	**3**
4A.	List the essential features of an expression vector with its significance.	**4**
4B.	Is it possible to ligate two heterologous fragments cleaved with SseBI and StuI?	**2**

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	Can the ligated DNA fragments be cleaved again with *Sse*BI or *Stu*I? Justify your answer. Recognition site sequence of *Sse*BI- AGG/CCT Recognition site sequence of *Stu*I- AGG/CCT	
4C.	Outline the principle of rDNA transformation in *E.coli* and yeast	**4**
5A.	You are asked to sequence a DNA fragment by the Maxam-Gilbert Method. Explain diagrammatically.	**4**
5B.	Three individual samples of the plasmid was taken and digested with *Eco*RI, *Hind*III, and both *Eco*RI and *Hind*III. Draw the restriction map of the plasmid. AGE visible DNA fragment sizes – *Eco*RI - 7kb+3kb, *Hind*III - 7kb+3kb, *Eco*RI + *Hind*III - 3kb+2kb.	**3**
5C.	Which parameter would you change first, if your PCR reaction gives too many products? What would you do if the PCR reaction gives very little, if any, of the correct product?	**3**
6A.	Which hybridization assay format is most useful when one wishes to **(i)** detect the presence of a pathogen's DNA in an aqueous clinical sample; **(ii)** detect the presence and location of a gene segment in a restriction digest of genomic DNA; and **(iii)** detect the presence and localization of a pathogen's DNA within a cell? Explain the hybridization method.	**4**
6B.	Discuss the method by which researchers study vast amount of human genomic DNA from the cells.	**4**
6C.	Classify the terms minisatelite, microsatellite with suitable examples.	**2**

Supplement Codon Table:

FIRST BASE	SECOND BASE U	SECOND BASE C	SECOND BASE A	SECOND BASE G	THIRD BASE
U	UUU Phe	UCU Ser	UAU Tyr	UGU Cys	U
	UUC Phe	UCC Ser	UAC Tyr	UGC Cys	C
	UUA Leu	UCA Ser	**UAA Stop**	**UGA Stop**	A
	UUG Leu	UCG Ser	**UAG Stop**	UGG Trp	G
C	CUU Leu	CCU Pro	CAU His	CGU Arg	U
	CUC Leu	CCC Pro	CAC His	CGC Arg	C
	CUA Leu	CCA Pro	CAA Gln	CGA Arg	A
	CUG Leu	CCG Pro	CAG Gln	CGG Arg	G
A	AUU Ile	ACU Thr	AAU Asn	AGU Ser	U
	AUC Ile	ACC Thr	AAC Asn	AGC Ser	C
	AUA Ile	ACA Thr	AAA Lys	AGA Arg	A
	AUG Met or start	ACG Thr	AAG Lys	AGG Arg	G
G	GUU Val	GCU Ala	GAU Asp	GGU Gly	U
	GUC Val	GCC Ala	GAC Asp	GGC Gly	C
	GUA Val	GCA Ala	GAA Glu	GGA Gly	A
	GUG Val	GCG Ala	GAG Glu	GGG Gly	G