Shahjalal University of Science & Technology, Sylhet

Department of Biochemistry and Molecular Biology

B. Sc. (Hons) **3rd Year 1st Semester** Final Examination, 2014

Course No. : **BMB -322** Course Title: **Molecular Biology-I**

Credit: **3.0** Total Marks: **70** Time: **3** Hours

Instructions:

- *Number in the right side indicates the marks of the question.*
- *Marks for each question are same.*
- ***Answer any two (2) questions from each Part (A and B).***

PART-A

1.	a)	Discuss the structural features of Watson-Crick proposed DNA model.	4.0
	b)	Write down the importance of the Watson-Crick proposal.	3.0
	c)	Show the H-bonding among purine and pyrimidine bases in a double stranded DNA.	3.0
	d)	Write down the functions of different RNAs.	5.0
	e)	Briefly discuss the secondary structure of RNA.	2.5
2.	a)	What is DNA supercoiling? Mathematically explain the supercoiling of DNA.	3.0
	b)	Explain the roles of topoisomerases on supercoiled DNA.	2.5
	c)	What is Cot value? How will you calculate the complexity of an organism?	4.0
	d)	Briefly discuss the complexity of eukaryotic genome.	4.0
	e)	Justify that-"Repeated DNA having both coding and non coding function."	4.0
3.	a)	What are the roles of RNA primers and Okazaki fragments during DNA replication?	2.0
	b)	Justify that DNA replication proceeds bidirectionally.	3.0
	c)	"DNA synthesis in a 5' to 3' direction is semi-discontinuous". - Justify.	3.5
	d)	How the prokaryotic DNA replication is initiated?	3.5
	e)	Summarize and compare the properties of DNA polymerase-I, II, III.	3.0
	f)	Demonstrate the AlkB dependent direct repair system.	2.5

PART-B

4.	a)	What is genetic code? Discuss the Wobble hypothesis with experimental evidence.	4.0
	b)	Write down the synthetic mechanism of amino acyl-tRNA.	3.0
	c)	"Shine Dalgarno sequence helps recruit the ribosome to the mRNA to initiate protein synthesis."- Justify.	2.5
	d)	Discuss the following types of posttranslational modification with example: (i) Attachment of carbohydrate side chain. (ii) Addition of prosthetic group. (iii) Proteolytic processing. (iv) Formation of di-sulfide linkage.	6.0
	e)	Discuss the role of chaperone protein in protein targeting.	2.0
5.	a)	How is transcription initiation controlled in bacterial cell?	2.0
	b)	Give a step-by-step description of the process of transcription.	6.0
	c)	What is promoter? Discuss the role of promoter on DNA transcription regulation?	4.0
	d)	What is the relevance of intron and exon sequences with respect to the final mRNA formation in eukaryotic posttranscriptional processing?	2.5
	e)	Discuss the structure and function of RNA polymerases (RNAPs).	3.0
6.	a)	Discuss the adsorption chromatography method for DNA extraction.	3.0
	b)	What are the essential components of a PCR used to amplify a specific sequence of DNA?	1.5
	c)	Outline the steps in a PCR cycle and write down the application of PCR technique in molecular Biology.	5.0
	d)	What is pyrosequencing? Discuss the method with its advantages and limitations.	4.0
	e)	Explain the principle and method of DNA sequencing by Sanger Dideoxy method.	4.0