Shahjalal University of Science & Technology, Sylhet
Department of Biochemistry and Molecular Biology
B. Sc. (Hons) 4th Year 1st Semester Final Examination, 2014
Course No: **BMB -421** Course Title: **Cell Biology**
Credit-**4** Total Marks-**70** Time-**3** hours

Instructions:

- *Answer any **two (2)** questions from each part (A and B)*
- *All questions have equal marks*

Part A

1.	(a)	Define the following terms: i) ATP caps and GTP caps, ii) Critical Concentration, iii) Plus and Minus ends	4.5
	(b)	"Dynamic Instability is due to the structural differences between a growing and a shrinking microtubule end" – explain.	4
	(c)	Discuss the effects of Thymosin and Profilin on actin polymerization. Write shortly about γ-TuRC.	3+2
	(d)	Some drugs namely Taxol, Vinblastine and Vincristine have been used to treat cancer. How they work?	4
2.	(a)	Shortly state the role of following proteins: i) Map ii) Connexin iii) Stathmin	4
	(b)	Write Shortly about Communicating Junctions.	4
	(c)	Justify the association of actin-cross-linking proteins in actin filament organization	4.5
	(d)	Illustrate- Motor proteins generate forces by coupling ATP hydrolysis to conformational Changes.	5
3.	(a)	What are the phases of cell cycle? Show diagrammatically - the control system can arrest cell cycle at specific check points.	2+2
	(b)	How cyclical proteolysis is used by cell cycle control system? Demonstrate with an example.	4
	(c)	What machineries are involved in initiating DNA replication in S phase? What's your idea about, if there was no system to initiate replication once per cycle?	3+2
	(d)	If DNA damage occurs during resting phase, would the cell progress with the cycle of division? Illustrate a control mechanism regarding this type of problem.	4.5

Part B

4.	(a)	Describe the role of cGMP in signaling system.	4
	(b)	How gene transcription is activated by a rise in cAMP concentration?	4.5
	(c)	What is 'Paracrine' signaling? Compare and contrast between 'Endocrine' and 'Synaptic' signaling.	4
	(d)	'A simple hormonal trigger can cause a very complex change in the pattern of gene expression'- explain.	5
5.	(a)	Why sexual reproduction is predominant in nature?	2
	(b)	What do you think, why in mammals, gamets are produced by meiotic division?	3
	(c)	What is *Sry* gene? Show how it influences on gonad development in mammal.	5
	(d)	The early mammalian embryo is highly regulative – explain.	3.5
	(e)	What is 'Acrosome reaction'? How it facilitates the entry of sperm nucleus into the egg cytoplasm?	4
6.	(a)	Why some cells of basal layer called 'Transit Amplifying Cells'? What is their function?	3
	(b)	What are the basic characteristics of a stem cell? How 50% of the daughters of stem cells in each generation remain as stem cells?	5
	(c)	Embryonic stem cells have totipotency- justify.	4.5
	(d)	A multipotent stem cell gives rise to all classes of blood cell- illustrate.	5