

[This question paper contains 5 printed pages]

Your Roll No ..

5809

J

B.Sc. (Hons.)/III

BIOCHEMISTRY—Paper XIV

(Cell Biology)

(Admissions of 2000 and onwards)

Time . 3 Hours

Maximum Marks 60

*(Write your Roll No on the top immediately
on receipt of this question paper)*

*Attempt any Five questions in all,
including Question No 1 which is compulsory*

1 (A) , Fill in the blanks 7×1=7

- (1) The .. are a family of proteases that are the effectors of apoptosis
- (2) .. are heterodimeric cell surface proteins that mediate inside-out and outside-in signalling in numerous tissues
- (3) The insertion of transit sequence via a TOC Complex is dependent on GTP hydrolysis by ..
- (4) The deficiency of .. leads to Tay Sachs disease

[P T O

- (5) Inactivation of . triggers cytokinesis
- (6) Cytosolic receptor targets proteins with sequence at the C-terminus into the peroxisomal matrix
- (7) A centriole contains. complete microtubules and a cilium contains complete microtubules
- (B) Which statements are true ? Explain why or why not 6×1 5= 9
- (1) The role of ATP hydrolysis in actin polymerization is similar to the role of GTP hydrolysis in tubulin polymerization both serve to weaken the bonds in the polymer and thereby promote depolymerization
- (2) Since there are about 10^{13} cells in an adult human and about 10^{10} cells die and are replaced each day, we become new people every three years
- (3) In plants plasmodesmata performs many of the same functions as gap junctions
- (4) There is one strict requirement for the exit of a protein from the ER It must be correctly folded
- (5) Nuclear pore complexes are specialized so that some mediate import while others mediate export

- (6) While other proteins come and go during the cell cycle, the proteins of the origin of recognition complex remain bound to the DNA throughout
- 2 (A) Give the diagrammatic representations for the following 6
- (1) The arrangement of titin molecules within the sarcomere
- (2) Vesicle movement powered by kinesin and dymin along the microtubule
- (3) Breakdown of nuclear envelope
- (B) Explain the technique through which cells can be distinguished and isolated in the G1, S, G2/M phase of the cell cycle 2
- (C) How is the unidirectional motion of a lamellipodium maintained ? 3
- 3 (A) Discuss the role of Cytochrome C in mitochondrial cell death pathway 5
- (B) Define primary cell, transformed cell and cultured cells and their use in Cell Biology experiments 4
- (C) Explain the contribution of Gunter Blobel 2
- 4 (A) What properties of cancer cells give them the ability to metastasize ? 3
- (B) Illustrate how the binding of an extracellular ligand to a cell surface protein can activate transmembrane signal transduction throughout the cell 4

- (C) How does a centrosome 'know' when it has found the centre of a cell ? 4
- 5 (A) Contrast the roles of 6
- 1 Collagen, proteoglycans and fibronectin in the extracellular space
 - 2 Actin, Intermediate filaments and microtubules
- (B) How the presence of check points in the cell cycle functions to ensure that complete genomes are transmitted to daughter cells ? 5
- 6 (A) Describe the steps in the synthesis of the core portion of an N-linked oligosaccharization taking place inside the rough ER How are these sugars transported in the ER and the golgi vesicles ? 5
- (B) What is the purpose of glycosylation ? 2
- (C) Discuss treadmilling and the role of ATP in the microfilament polymerization At what concentration of monomers does it occur ? 4
- 7 (A) How does the tethering and docking of vesicles to the targeting compartment takes place What determines the specificity of interaction between a transport vesicle and the membrane compartment with which it will fuse 6
- (B) What are cyclins ? What do you mean by accumulation and degradation of the cyclins ? 5

- 8 (A) Explain the pathway for transporting proteins from the cytosol to be inserted into the inner membrane of the mitochondria 5
- (B) How does the twin-arginine-translocation pathway differ from Sec pathway in the import of proteins into thylakoid lumen or membranes 3
- (C) Compare the energy inputs needed to import proteins into mitochondria and chloroplast 3