R.M.

Indian Institute of Technology Kharagpur

QUESTION-CUM-ANSWERSCRIPT

Stamp/Signature of the Invigilator

MID-SEMESTER / END-SEMESTER EXAMINATION	SEMESTER (Autumn / Spring)

Roll Number								Section	Name
Subject Number: BS20001								Science of Living Systems Full Marks-25	UNIT II
Department/Centre/School								Additional Sheets	

Important Instructions and Guidelines for Students

1. You must occupy your seat as per the Examination Schedule/Sitting Plan.
2. Do not keep mobile phones or any similar electronic gadgets with you even in the switched off mode.
3. Loose papers, class notes, books or any such materials must not be in your possession; even if they are irrelevant to the subject you are taking examination.
4. Data book, codes, graph papers, relevant standard tables/charts or any other materials are allowed only when instructed by the paper-setter.
5. Use of instrument box, pencil box and non-programmable calculator is allowed during the examination. However, the exchange of these items or any other papers (including question papers) is not permitted.
6. Write on both sides of the answer-script and do not tear off any page. **Use last page(s) of the answer-script for rough work**. Report to the invigilator if the answer-script has torn or distorted page(s).
7. It is your responsibility to ensure that you have signed the Attendance Sheet. Keep your Admit Card/Identity Card on the desk for checking by the invigilator.
8. You may leave the Examination Hall for wash room or for drinking water for a very short period. Record your absence from the Examination Hall in the register provided. Smoking and the consumption of any kind of beverages are strictly prohibited inside the Examination Hall.
9. Do not leave the Examination Hall without submitting your answer-script to the invigilator. **In any case, you are not allowed to take away the answer-script with you**. After the completion of the examination, do not leave your seat until the invigilators collect all the answer-scripts.
10. During the examination, either inside or outside the Examination Hall, gathering information from any kind of sources or exchanging information with others or any such attempt will be treated as '**unfair means**'. Don't adopt unfair means and also don't indulge in unseemly behavior.

Violation of any of the above instructions may lead to severe punishment.

Signature of the Student

To be Filled by the Examiner

Question Number	Part I	Part II	Total
Marks Obtained			

Marks Obtained (in words)	Signature of the Examiner

PLEASE READ THE INSTRUCTIONS CAREFULLY

- END SPRING SEMESTER OF 'SCIENCE OF LIVING SYSTEMS' CONSISTS OF TWO UNITS: UNIT-II AND UNIT-III. STUDENTS HAVE TO ANSWER BOTH THE UNITS IN THE CORRESPONDING QUESTION PAPER CUM ANSWER SCRIPT WITHIN 3 HRS TIME.
- **THIS PART IS UNIT-II.**
- **ANY QUERIES RELATED TO QUESTIONS WILL NOT BE ENTERTAINED DURING EXAMINATION**
- NO SEPARATE ANSWER SCRIPT IS PERMISSIBLE.
- EACH UNIT CONSISTS OF 25 MARKS.
- ANSWER ALL PARTS OF EACH QUESTION IN THE DESIGNATED PLACE ONLY.
- ANSWER PRECISELY TO THE POINT OR TICK MARK ONLY THE CORRECT ANSWER OR WRITE THE MOST APPROPRIATE ANSWER TO FILL-IN THE BLANK.
- SUBMIT UNIT-II AND UNIT-III SEPARATELY.

Part – I (Total 10 marks) Choose the correct (only ONE) answer. 0.5 mark each.

1. Which of the following is not present in bacteria
   A. ribosome B. nucleic acid C. nucleus D. cytoplasm

2. Which of the following is true
   A. Outer membrane is present in Gram positive bacteria
   B. Peptidoglycan layer is thick in Gram +ve, and thin in Gram –ve bacteria
   C. Peptidoglycan layer is thin in Gram +ve and thick in Gram –ve bacteria
   D. Thickness of peptidoglycan layer is same in both Gram +ve and Gram –ve bacteria

3. Microscope's power to increase an object's apparent size is called
   A. Resolution B. magnification C. optimization D. transmission

4. Antibiotic penicillin acts on
   A. Cell wall B. cell membrane C. ribosome D. DNA

5. Which of the following helps in processing and transports of proteins
   A. Ribosome B. lysosome C. endoplasmic reticulum D. mitochondria

6. Which of the following cellular structures always disappears during mitosis and meiosis?
   A. Plasma membrane B. cytoskeleton C. nuclear envelop D. mitochondria

7. DNA replication occurs at _____ phase of the cell cycle.

8. How many ATPs are generated (net gain) from one molecule of glucose through cellular respiration that includes glycolysis, Krebs cycle and ETC/oxidative phosphorylation?
   A. 48 B. 38 C. 18 D. 8

9. Different steps of respiration occur in different parts of the cell. Where in the cell does Krebs cycle occur?
   A. Chloroplast B. Endoplasmic reticulum C. Cytoplasm D. Mitochondria

10. During chemi-osmotic phosphorylation in mitochondria, _____(an enzyme complex) helps in the generation of ATP.

11. In aerobic cellular respiration, which of the following generates more ATP
    A. Substrate-level phosphorylation B. Chemiosmosis C. Both A and B generate equal amount of ATPs.
12. What substance is produced by the oxidation of pyruvate and feeds into the citric acid cycle?
    A. Acetyl CoA B. Oxaloacetate C. citrate D. malate

13. Assume a thylakoid is somehow punctured so that the interior of the thylakoid is no longer separated from the stroma. This damage will have the most direct effect on which of the following processes?
A. Splitting of water B. reduction of NADP C. synthesis of ATP D. absorption of light energy by chlorophyll

14. How many carbon atoms are in a molecule of RuBP?
A. 6 B. 5 C. 4 D. 3

15. Cyclin and cyclin-dependent kinases are involved in
A. photosynthesis B. respiration C. control of cell cycle in eukaryotes D. control of cell cycle in bacteria

16. The protein _____ plays important role in the apoptotic pathway of programmed cell death.

17. Which enzyme fixes CO_2 to minimize photorespiration?

18. In which part of the cell does glycolysis take place?

19. Bacterial peptidoglycan is a polymer of
A. Sugar B. sugar and nucleotide C. sugar and lipid D. sugar and amino acid

20. During photosynthesis, photons raise electrons to higher energy levels. These excited electrons belong to what compound?
A. H2O B. ATP C. RuBP D. Chlorophyll

Part – II (Total 15 marks) Answer briefly.

1. Match all of the following (A-F) with their corresponding cellular organelle (i-vi):
   A. Thylakoid B. Granum C. Cristae D. Matrix E. 30S subunit F. Cisternae.
   i. Chloroplast ii. Golgi apparatus iii Mitochondria iv. Ribosome
   v. Chloroplast vi Mitochondria 1.5 marks

2. Indicate true and false for the following statements 1 mark
   A. Sperm and egg, both are haploid
   B. E. coli genome is diploid
   C. Mitosis is an example of reduction division
   D. Human liver cells are haploid

3. i) State two differences between mitosis and meiosis. 1 mark

ii) How does meiosis lead to genetic diversity? 0.5 mark

4. Write down the phases of cell cycle and briefly describe them. 2 mark

5. Write down the overall equations of cellular respiration and photosynthesis. 1 mark

6. Indicate true and false from the following statements 1 mark
   A. Plants are autotrophs
   B. Photosynthesis is an anabolic and endergonic process
   C. Mg^{++} is required for the function of chlorophyll
   D. Photorespiration occurs in C4 plants

7. What is RuBisCO? Describe its significance in photosynthesis 2 mark

8. Write the names of the high energy molecules produced after the light reaction during photosynthesis. 0.5 mark

9. Write down the characteristic biochemical changes that can be used to identify programmed cell death. 1.5 marks

10. What is the significance of membrane bound proteins in both photosynthesis and respiration? 1 mark

11. During glycolysis, how many molecules of pyruvic acid are formed from one molecule of glucose? Is this process oxidation or reduction? Is oxygen involved? Why? 2 mark