



# COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Government of Maharashtra.)  
SHIVAJI NAGAR, PUNE - 411 005

## END Semester Examination

### (AS-09001) Applied Biology

Course: B.Tech

Branch: Civil Engineering

Semester: Sem V

Year: 2014-2015

Max Marks:60

Duration: 3 Hours  
Time:- 2-5 pm

Date:21/11/2014

#### Instructions:

MIS No.

|  |  |  |  |  |  |  |  |  |  |
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1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of anything like stationery, calculator is not allowed.
5. Assume suitable data if necessary.
6. Write your MIS Number on Question Paper
7. Enrich your answer with figures, examples and logical explanation.

|       |  |    |
|-------|--|----|
| Q. 1a | Fill in the blanks   | 02 |
|       | i) Outer dry crust of the earth is called _____.                       |    |
|       | ii) Macromolecular aggregates are called as _____.                     |    |
|       | iii) First genetic code was based on _____.                            |    |
|       | iv) _____ was the first phase in chemical evolution.                   |    |
| Q. 1b | Differentiate between the following with minimum two points. (any two) | 04 |
|       | i) Biogenesis and Abiogenesis  |    |
|       | ii) DNA and RNA  |    |
|       | iii) Simple lipids and Conjugated lipids.                              |    |
| Q. 1c | Write about: (any two)   | 04 |
|       | i) Experimental evidence of abiogenic origin of life.                  |    |
|       | ii) Metabolism in living cells   |    |
|       | iii) Specialty areas in Bioengineering Sciences                        |    |

| Q. 2a                      | Match the following, rewrite the appropriate pair   | 02               |                 |                 |                           |                  |   |                            |                           |               |                             |  |
|----------------------------|---|------------------|-----------------|-----------------|---------------------------|------------------|---|----------------------------|---------------------------|---------------|-----------------------------|--|
|                            | <table border="1"> <thead> <tr> <th><u>Organelle</u></th> <th><u>Function</u></th> </tr> </thead> <tbody> <tr> <td>i) Mitochondria</td> <td>Photosynthesis</td> </tr> <tr> <td>ii) Chloroplast</td> <td>Active, Passive transport of materials</td> </tr> <tr> <td>iii) Endoplasmic reticulum</td> <td>Power house, energy coins</td> </tr> <tr> <td>iv) Lysosomes</td> <td>Digestion</td> </tr> </tbody> </table>        | <u>Organelle</u> | <u>Function</u> | i) Mitochondria | Photosynthesis            | ii) Chloroplast  | Active, Passive transport of materials          | iii) Endoplasmic reticulum | Power house, energy coins | iv) Lysosomes | Digestion                   |  |
| <u>Organelle</u>           | <u>Function</u>   |                  |                 |                 |                           |                  |   |                            |                           |               |                             |  |
| i) Mitochondria            | Photosynthesis  |                  |                 |                 |                           |                  |   |                            |                           |               |                             |  |
| ii) Chloroplast            | Active, Passive transport of materials  |                  |                 |                 |                           |                  |   |                            |                           |               |                             |  |
| iii) Endoplasmic reticulum | Power house, energy coins   |                  |                 |                 |                           |                  |   |                            |                           |               |                             |  |
| iv) Lysosomes              | Digestion   |                  |                 |                 |                           |                  |   |                            |                           |               |                             |  |
| Q. 2b                      | Answer the followings: (any two)  | 04               |                 |                 |                           |                  |   |                            |                           |               |                             |  |
|                            | <ul style="list-style-type: none"> <li>i) Explain the process of evolution of eukaryotes.</li> <li>ii) Discuss the functional types of cell to cell junctions.</li> <li>iii) Describe in brief the colorimetric technique.</li> </ul>   |                  |                 |                 |                           |                  |   |                            |                           |               |                             |  |
| Q. 2c                      | Attempt the following: ( any two)   | 04               |                 |                 |                           |                  |   |                            |                           |               |                             |  |
|                            | <ul style="list-style-type: none"> <li>i) Draw fluid mosaic model of Cell membrane</li> <li>ii) Types of channel proteins</li> <li>iii) Labeled diagram of typical Prokaryotic cell</li> </ul>  |                  |                 |                 |                           |                  |   |                            |                           |               |                             |  |
| Q. 3a                      | State whether the given statement is true or false with justification...  | 02               |                 |                 |                           |                  |   |                            |                           |               |                             |  |
|                            | <ul style="list-style-type: none"> <li>1) Chlorophyll b is a reaction centre</li> <li>2) Dark reaction will not place during day time</li> <li>3) RUBISCO is a carbon acceptor molecule</li> <li>4) Prokaryotic cells are advanced</li> </ul>   |                  |                 |                 |                           |                  |   |                            |                           |               |                             |  |
| Q. 3b                      | Differentiate between the following pairs with minimum 4 points   | 04               |                 |                 |                           |                  |   |                            |                           |               |                             |  |
|                            | <ul style="list-style-type: none"> <li>1) Cyclic and non-cyclic photophosphorylation</li> <li>2) Photosynthesis and respiration</li> </ul>  |                  |                 |                 |                           |                  |   |                            |                           |               |                             |  |
| Q. 3c                      | Write a note on .. (Any two)  | 04               |                 |                 |                           |                  |   |                            |                           |               |                             |  |
|                            | <ul style="list-style-type: none"> <li>1) Levels of organization</li> <li>2) Chemiosmosis</li> <li>3) Gene farming</li> </ul>   |                  |                 |                 |                           |                  |   |                            |                           |               |                             |  |
| Q. 4a                      | Match the following and rewrite the appropriate pair  | 02               |                 |                 |                           |                  |   |                            |                           |               |                             |  |
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| <u>Enzyme</u>              | <u>Action</u>   |                  |                 |                 |                           |                  |   |                            |                           |               |                             |  |
| 1) Helicase                | Joining Okazaki fragments   |                  |                 |                 |                           |                  |   |                            |                           |               |                             |  |
| 2) Topoisomerase           | Initiation of synthesis of complimentary strand   |                  |                 |                 |                           |                  |   |                            |                           |               |                             |  |
| 3) Primase                 | Stabilization of helix  |                  |                 |                 |                           |                  |   |                            |                           |               |                             |  |
| 4) Ligase                  | Opening of replication fork   |                  |                 |                 |                           |                  |   |                            |                           |               |                             |  |
| Q. 4b                      | Mention the significance of .. (any two)  | 04               |                 |                 |                           |                  |   |                            |                           |               |                             |  |
|                            | <ul style="list-style-type: none"> <li>1) Formation of a DNA bubble</li> <li>2) tRNA in protein synthesis</li> </ul>  |                  |                 |                 |                           |                  |   |                            |                           |               |                             |  |

|              |  |           |
|--------------|--|-----------|
|              | 3) <i>taq</i> polymerase in PCR  |           |
| <b>Q. 4c</b> | <b>Explain any two methods of scaffold synthesis ..</b>                    | <b>04</b> |
|              | 1) Textile technology<br>2) Gas foaming<br>3) Emulsification/Freeze-drying |           |

**FOR METALLURGY & MATERIAL ENGINEERING BRANCH**

| <b>Q. 5a</b>      | <b>Match the following and rewrite the appropriate pair</b>   | <b>02</b>         |                |                 |  |                   |   |                   |                                |                  |  |  |
|-------------------|---|-------------------|----------------|-----------------|--|-------------------|---|-------------------|--------------------------------|------------------|--|--|
|                   | <table border="0" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;">Type of biosensor</th> <th style="text-align: left; border-bottom: 1px solid black;">Principle used</th> </tr> </thead> <tbody> <tr> <td>1) Amperometric</td> <td>Movement of protons across the electrode</td> </tr> <tr> <td>2) Conductimetric</td> <td>Movement of Electron across the electrode</td> </tr> <tr> <td>3) Potentiometric</td> <td>Concentration of ionic species</td> </tr> <tr> <td>4) Piezoelectric</td> <td>Electric effect generated through stress</td> </tr> </tbody> </table> | Type of biosensor | Principle used | 1) Amperometric | Movement of protons across the electrode | 2) Conductimetric | Movement of Electron across the electrode | 3) Potentiometric | Concentration of ionic species | 4) Piezoelectric | Electric effect generated through stress |  |
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| 1) Amperometric   | Movement of protons across the electrode  |                   |                |                 |  |                   |   |                   |                                |                  |  |  |
| 2) Conductimetric | Movement of Electron across the electrode   |                   |                |                 |  |                   |   |                   |                                |                  |  |  |
| 3) Potentiometric | Concentration of ionic species  |                   |                |                 |  |                   |   |                   |                                |                  |  |  |
| 4) Piezoelectric  | Electric effect generated through stress  |                   |                |                 |  |                   |   |                   |                                |                  |  |  |
| <b>Q. 5b</b>      | <b>Explain any two of the following ..</b>  | <b>04</b>         |                |                 |  |                   |   |                   |                                |                  |  |  |
|                   | 1) Mechanism of detecting malarial infection through skin by nanotechnology<br>2) Problems of SS and Ti<br>3) Use of 316L Stainless Steel in artificial implants  |                   |                |                 |  |                   |   |                   |                                |                  |  |  |
| <b>Q. 5c</b>      | <b>Mention the significance of ..</b>   | <b>04</b>         |                |                 |  |                   |   |                   |                                |                  |  |  |
|                   | 1) Sequential drug delivery system<br>2) Pressure sensitive adhesives<br>3) Nanotechnology in fabrics   |                   |                |                 |  |                   |   |                   |                                |                  |  |  |
| <b>Q. 6a</b>      | <b>What is the meaning of ...</b>   | <b>02</b>         |                |                 |  |                   |   |                   |                                |                  |  |  |
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| 1) CFRP           | 3) SMA basket   |                   |                |                 |  |                   |   |                   |                                |                  |  |  |
| 2) Metamaterial   | 4) Vapour nanobubbles   |                   |                |                 |  |                   |   |                   |                                |                  |  |  |
| <b>Q. 6b</b>      | <b>Write about the benefits of ..</b>   | <b>04</b>         |                |                 |  |                   |   |                   |                                |                  |  |  |
|                   | 1) BAE system in aircraft    2) Nanomaterial    3) Biosensors   |                   |                |                 |  |                   |   |                   |                                |                  |  |  |
| <b>Q. 6c</b>      | <b>Mention the type of materials used for following with reason ..</b>  | <b>04</b>         |                |                 |  |                   |   |                   |                                |                  |  |  |
|                   | 1) Dental alloy    2) Bone cement    3) Ligament injury   |                   |                |                 |  |                   |   |                   |                                |                  |  |  |

**FOR CIVIL ENGINEERING BRANCH**

|              |  |           |
|--------------|--|-----------|
| <b>Q. 5a</b> | <b>Explain 3R principles in the Environmental Engineering.</b>                                     | <b>02</b> |
|              |  |           |
| <b>Q. 5b</b> | <b>What is Biological sewage treatment? Describe in detail the Activated Sludge Process (ASP).</b> | <b>04</b> |
|              |  |           |
| <b>Q. 5c</b> | <b>Describe in brief: (any two)</b>  | <b>04</b> |
|              | i) Rotating Biological contactors  |           |

|       |   |    |
|-------|---|----|
|       | ii) Anaerobic Filter Process  |    |
|       | iii) Tertiary treatment of sewage.                                    |    |
| Q. 6a | Write in brief on Biological aspects of Ajantha and Ellora paintings. | 02 |
|       |   |    |
| Q. 6b | What is Biologically enhanced crack remediation? Explain.             | 04 |
|       |   |    |
| Q. 6c | Justify, " Birds produces best shelter designs in the nature"         | 04 |
|       |   |    |