

College of Engineering, Pune

F. Y. B. Tech

AS 105- Living Machines

Date-

Academic Year: 2008- 09

Timing: 3 hrs

Max. Marks: 50

End Semester

Instructions:

1 Solve all the questions

2 Figures to right indicates full marks.

3 Do not keep mobile phones with you the handsets will be retained permanently by exam cell.

Q. 1 A. Fill in the blanks with appropriate word/s & rewrite the sentence – any 5 Marks (5)

- i. For biological & medical applications _____ nanoparticles are conjugated to biomolecules.
- ii. During dark reaction of photosynthesis atmospheric CO₂ is accepted by RuDP in _____ phase.
- iii. Chemical evolution hypothesis was given by _____ & _____.
- iv. _____ Washing away of slime layer in trickling filter is called as _____.
- v. In confocal microscope light passing through pinhole is measured by _____.
- vi. Plasmids are introduced in *E. coli* cells by the process of _____.
- vii. _____ model was proposed by Peter Mitchell.

B. State whether following statements are true or false – any 5 (5)

- i. Genetic engineering & traditional breeding are similar methods for gene manipulation in organisms.
- ii. For hydrolytic reactions $\Delta G^\circ = -RT \ln K_{eq}$.
- iii. GAGs are synthetic scaffold materials.
- iv. Stanley Miller gave experimentle evidence for biogenic origin of life.
- v. CT scan is an important tool in medical imaging to supplement X-rays & ultrasonography.
- vi. Engineers develop mitigation measures to limit or prevent adverse impacts of a proposed project.
- vii. Anaerobic bacteria evolved into mitochondria of modern eukaryotes.

Q. 2 A. Define the following – any 4 (4)

- | | |
|------------------------------|-------------------------------|
| i. Computational biology | ii. Biomaterials |
| iii. Clone of a DNA molecule | iv. Transducer |
| v. Biosensor | vi. Environmental engineering |

B. Give reasons (4 reasons each)– any 3

- i. Why sludge requires further treatment?
- ii. Why plantation is done on road side?
- iii. Why dynamic volume CT is more advantageous than CT scan?
- iv. Why DNA samples are heated & then cooled during DNA hybridization/
- v. Why liposomes are used in cosmetics?

Q. 3 A. Write short notes on (4 points each)– any 2

(4)

- i. Optimization of biological machines on cellular level.
- ii. Taq polymerase.
- iii. Stem cells.

B. Differentiate between (3 differences each)– any 2

(6)

- i. MRI and CT scan
- ii. Genomics and Proteomics
- iii. Plant cell and Animal cell

Q. 4 A. Give four applications of the following (4 applications each)– any 2

(4)

- i. Biosensors
- ii. Confocal microscopy
- iii. P C R
- iv. Biomaterials

B. What is “ Bioremediation”? How it is implemented? Explain with suitable example.

(3)

C. Explain working of FACS machine with a suitable diagram.

(3)

Or

Only describe various steps in colony hybridization.

Q. 5 A. Sketch and label (4 correct labels each)– any 2

(6)

- i. Path of light beams in confocal microscope.
- ii. Trickling filter
- iii. Parts of a biosensor

B. Attempt the following – any 2

(4)

- i. Why scaffolds are used in tissue culture?
- ii. State types (only names) of biosensors and describe any one of them.
- iii. What are different types of MRI? Describe any two types.