CBCS SCHEME

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21BE45

Fourth Semester B.E. Degree Examination, June/July 2024
Biology for Engineers

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the classification of carbohydrates with examples. **(06 Marks)**

b. Explain the working of DNA finger printing for forensic applications. **(06 Marks)**

c. Discuss the benefits and uses of plant based proteins as alternatives to animal based proteins. **(08 Marks)**

OR

2 a. Discuss the key features of RNA vaccine for COVID-19 with examples. **(06 Marks)**

b. Elucidate the process of obtaining bio-diesel from lipids. Discuss any four advantages of bio-diesel? **(08 Marks)**

c. Explain the role of glucose-oxidase enzyme in biosensors and lignolytic enzyme in bio-bleaching. **(06 Marks)**

Module-2

3 a. Compare and list the salient features of human brain as CPU of a computer and discuss their architectures using suitable diagrams. **(08 Marks)**

b. Explain the term cataract giving reasons for its cause and symptoms? What is the solution to overcome the same? List any two lens materials in use? **(04 Marks)**

c. Using relevant diagram describe the electrical signaling of the human heart and it's monitoring in the ECG trace. **(08 Marks)**

OR

4 a. Compare and explain the similarities between the working of human eye with that of a camera, using suitable diagrams. **(08 Marks)**

b. Explain the term electro encephalography (EEG)? Discuss any four engineering solutions for Parkinson's disease. **(07 Marks)**

c. Discuss the design features of stent. **(05 Marks)**

Module-3

5 a. Using the architecture diagram, explain the mechanism of purification of air in lungs and the exchange of O_2 , CO_2 gases. **(08 Marks)**

b. Discuss the causes, symptoms and treatment options for chronic kidney disease (CKD). **(06 Marks)**

c. Using the architecture diagram, explain the working of skeletal muscle. **(06 Marks)**

OR

6 a. Describe the term Chronic Obstructive Pulmonary Disease (COPD). Give reasons for its cause and the possible medical treatment options. **(06 Marks)**

b. With neat architecture diagram, explain the mechanism of filtration of blood in kidneys and the formation of urine. **(08 Marks)**

c. Discuss any three bioengineering solutions for muscular dystrophy and osteoporosis. **(06 Marks)**

Module-4

7 a. Describe the working principle of ultrasonography. List any four uses of ultrasonography. **(08 Marks)**

b. Discuss any four technological applications of bionic leaf. **(04 Marks)**

c. Compare and discuss the bio mimicking facts about birds fly with that of aircraft technology. **(08 Marks)**

OR

8 a. Explain the lotus leaf effect and discuss any two applications of super hydrophobic and self cleaning surfaces. **(08 Marks)**

b. Discuss any five applications of Velcro technology. **(05 Marks)**

c. Discuss the basic requirements for human blood substitutes. Discuss any two advantages and haemoglobin based oxygen carries and perflourocarbons as human blood substitutes. **(07 Marks)**

Module-5

9 a. Describe the working of any one bioprinting technique using suitable diagram. Make a list of bioprinting materials. **(07 Marks)**

b. Discuss the concepts and technology behind the working of electrical tongue in food science. **(06 Marks)**

c. Explain the process of removing polluting heavy metals using bioremediation or biomining via microbial surface adsorption. Give examples of the microbes used for removing any two polluting heavy metals. **(07 Marks)**

OR

10 a. Discuss the importance of 3D printing in food industry. Give examples of 3D printed foods. **(06 Marks)**

b. Explain the term DNA origami and its technological importance. **(06 Marks)**

c. Discuss any four applications and limitations of artificial intelligence for disease diagnosis. **(08 Marks)**

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