BACHELOR OF ENGINEERING IN ELECTRICAL ENGINEERING EXAMINATION, 2022

(4th Year, 2nd Semester)

INTRODUCTION TO NANO- BIO TECHNOLOGY

Time: Four Hours | Full Marks: 70

(35 marks for each part)

Use a **separate** Answer-script for each Part

PART-I

Answer ***any two*** questions

One Mark is reserved for neatness

1. Explain how a(i) rotary and a (ii) linear motion molecular bio-motor can be implemented. Draw suitable sketches in support of your answer. 9+8

2. How photo-induced electron transport takes place in DNA? Compare with respect to HOMO-control andLUMO-control. Depict the experimental setup for the same. 2+10+5

3. a) Identify some important topics of research in nano-biotechnology. 7

   b) Describe a "respirocyte" and its proposed working principle. 5

   c) What is "bioengineered cell rover"? Explain its function. 5

4. a) Describe the "top-down" and "bottom-up" approach of nano-bio technology. 5

   b) Write short notes on (i) Liposomes and (ii)Dendrimers and (iii) Microbivore. 4+4+4

Ex/EE/T/422A/2022

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PART-II

Answer any two from Q.1 –Q.4 and Q.5 (compulsory)

1

a) Describe the different structures of carbon nanotube. 6

b) Briefly explain the different fabrication processes of carbon nanotube. 9

2.

a) In brief, explain the following nano material characterization tools:

Atomic Force Microscopy, Fluorescence microscopy and Electron microscopy 4+4+4

b) Mention the different commercial application of nanotechnology. 3

3. a) Describe the different forces that play vital roles in creation of stable nanostructures. 9

b) Discuss the different properties of carbon nanotube 6

4. a) What is Moore's law? What are the factors enabling Moore's law? 6

b) Explain Moore's Second Law. 6

c) Briefly explain the development of nanoscale transistors 3

5. Write short notes on **any one** of the following: 5

a) Quantum Computing.

b) Tools used for making nanostructures.

c) Nanoscale forces