BACHELOR OF ENGINEERING (EVENING) IN ELECTRICAL ENGINEERING EXAMINATION, 2019

(5th Year, 2nd Semester)

INTRODUCTION TO NANO- BIO TECHNOLOGY

Time: Three Hours

Full Marks: 100

(50 marks for each part)

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

PART-I

Answer *any three* questions

Two marks are reserved for neat and well organized answer script

1. a) What is "microbivore"? Explain in brief. — 3

   b) Describe a "respirocyte" and its proposed working principle. — 3

   c) What is "bioengineered cell rover"? Explain its function. — 4

   d) Mention topics for research in nano-bio technology in the coming years. — 6

2. a) Briefly describe nanoscale and nanostructures with suitable illustrations. — 5

   b) With suitable schematic, show various types of pharmaceutical nano systems. — 5

   c) What are Liposomes and Dendrimers? Explain in brief. — 6

3. How photoinduced electron transport takes place in DNA? Compare with respect to HOMO-control and LUMO-control. — 16

4. Briefly describe some advancements in nano-bio technology highlighting (i) nanocomputing and (ii) DNA based nanotechnology and nanoelectronics. — 16

5. Write short notes on (i) rotary and (ii) linear motion molecular bio-motor. — 16

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PART-II

Answer any three questions

(2 marks for neat and well-organized answers)

1. a) Briefly explain different forces that play vital roles in creation of stable nanostructures.   9

   b) Describe in brief different commercial application of nanotechnology.   7

2. a) Describe different structures and properties of carbon nanotubes.   7

   b) Explain different fabrication processes of carbon nanotubes.   9

3. State in brief the following material characterization tools   5+5+6

   a) Atomic Force Microscopy

   b) Fluorescence microscopy

   c) Electron microscopy

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

   b) Explain Moore's Second Law.   7

   c) What do you mean by the terms SWCT and MWCT?   3

5. Write short notes on the following: 2×8

a) Quantum Computing

b) Development of nanoscale transistors

c) Different application of carbon nanotubes