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ECE 1817 PE 22

Roll No. of candidate

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23/12/2021

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UNIT 5, 5/F, 5/F
A. V. M. Hall, Wapara,
Kolkata-751017

B.Tech 7th Semester End-Term Examination

ECE + ETE

NANOELECTRONICS

(New Regulation (w.e.f 2017-2018) and New Syllabus (w.e.f 2018-2019))

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer Question No.1 and any *four* from the rest.

1. Answer the following: (10 × 1 = 10)
 - (i) 10 nm is approximately equivalent to?
 - (ii) A quantum dot is 0D or 1D?
 - (iii) What is the range of nanodevices?
 - (iv) A strand of human hair is how much nm wide?
 - (v) What is a semiconductor heterostructure?
 - (vi) Define surface Plasmon.
 - (vii) Mention two fields where nanotechnology finds application.
 - (viii) What are Auger electrons?
 - (ix) Nanogold scatter or reflect light?
 - (x) What are backscattered electrons?

2.
 - (a) What is nanotechnology? Give its various areas of applications. (2+4=6)
 - (b) How many carbon nanotubes 1nm in diameter can be tightly packed into a cylinder defined by a human hair 100 μm in diameter? (4)
 - (c) What are the various factors that affect the unconventional behavior of nanomaterials? (5)

[Turn over

3. (a) Write the Schrodinger time dependent and time independent equation. (4)
(b) Explain the particle in a box concept. (7)
(c) What is Brillouin zone? (4)
4. (a) Explain and differentiate between electrons in quantum well, quantum wire and quantum dot. (8)
(b) What are carbon nanomaterials? Explain. (7)
5. (a) What is top-down fabrication method? What are the top-down methods? Explain any one in detail. (2+2+4=8)
(b) Bottom-up method can be divided into how many types? Explain the Chemical Vapour deposition method. (3+4=7)
6. (a) What are the major tools used for characterization of nanomaterials? Explain. (8)
(b) What steps can be taken to gather information of an unknown sample of nanomaterial? (7)
7. Write notes on (any three): (3×5=15)
(a) Diffusive and Ballistic transport of electrons
(b) Bonding in crystals
(c) Kronig Penny Model
(d) SOL-GEL synthesis

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