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ECE 1817 PE 22

Roll No. of candidate

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2022

BINA CHOWDHURY CENTRAL LIBRARY
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Azara, Hatkhowapara,
Guwahati - 781017

B.Tech. 7th Semester End-Term Examination

ECE + ETE

NANOELECTRONICS

New Regulations (w.e.f 2017-18) & New Syllabus (w.e.f 2018-19)

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 questions : (10 × 1 = 10)
 - (a) 1 mm is equal to _____ nm.
 - (b) CNTs are highly sensitive to changes in _____
 - (c) Nano devices are in the range of _____
 - (d) A strand of human hair is approx _____ nm wide.
 - (e) A quantum dot is _____ dimensional.
 - (f) Lithography uses _____ to remove layers of material.
 - (g) In _____ the electron beam is rastered across analytical surface.
 - (h) BAM is used to analyze _____ at air-water interface.
 - (i) Nanogold _____ light. (Scatter/absorb/reflect/refract)
 - (j) Auger electrons are used for _____ analysis.

2.
 - (a) What is nanotechnology? Difference between nanoscience and nanotechnology. (1+3)
 - (b) If an unknown colloidal sample of nanomaterial is given, what steps should be taken to gather information about it? (7)
 - (c) Mention some applications of nanotechnology. Explain any one in detail. (4)

[Turn over

3. (a) Discuss the Kronig Penney Model. (8)
(b) What is Brillouin zone? (7)
4. (a) Explain the energy bands in solids. (5)
(b) Explain the different types of bonding that exists in crystals. (5)
(c) What is a semiconductor heterostructure? Explain. (5)
5. (a) Explain and differentiate between electrons in quantum well, quantum wire and quantum dot. (8)
(b) Why do quantum dots made of same material but of different size demonstrate emission at different wavelengths? (7)
6. (a) What is top-down fabrication method? Explain photolithography. (7)
(b) Explain the Chemical Vapour deposition method and SOL-GEL synthesis method. (4+4)
7. Write short notes on (any three): (3 × 5=15)
(a) Schrodinger equation
(b) Carbon nanotubes
(c) Diffusive and Ballistic transport of electrons
(d) Characterisation tools of nanomaterials

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