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10NT42

Fourth Semester B.E. Degree Examination, June/July 2015
Introduction to Material Science and Engineering

Time: 3 hrs.

Max. Marks:100

*Note: Answer FIVE full questions, selecting
at least TWO questions from each part.*

PART – A

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|----------|---|------------|
| 1 | a. Explain about different types of material with their applications. | (10 Marks) |
| | b. Write a brief note on the bonding and molecular interactions. | (10 Marks) |
| 2 | a. What are unit cells? Explain the Bravais lattice of different crystal systems. | (10 Marks) |
| | b. Describe briefly about the crystal structure of sodium chloride and diamond. | (10 Marks) |
| 3 | a. What are dislocations? Mention the significance of dislocation. | (05 Marks) |
| | b. What are surface defects? State the importance of defects. | (10 Marks) |
| | c. Define slip. Explain the mechanism with factors affecting slip. | (05 Marks) |
| 4 | a. Write a brief note on experimental diffraction methods. | (10 Marks) |
| | b. State Bragg law. Derive an expression for constructive interference. | (10 Marks) |

PART – B

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| 5 | a. What are phonons? Explain the phonon drag phenomenon. | (05 Marks) |
| | b. What is relaxation time? Derive an expression for relaxation time. | (06 Marks) |
| | c. Write a short note on impurity scattering. | (04 Marks) |
| | d. What is electrical conductivity? Explain about various factors affecting electrical conductivity. | (05 Marks) |
| 6 | a. State thermal conductivity. Derive the expression for thermal conductivity. | (10 Marks) |
| | b. Write a brief note on thermoelectric effects on semiconductors. | (10 Marks) |
| 7 | a. Explain about the mechanism of electronic polarization. | (08 Marks) |
| | b. Write a note on ionic polarization. | (06 Marks) |
| | c. Derive an expression for dielectric loss. | (06 Marks) |
| 8 | a. What is Hall effect? Explain the relationship between magnetic field and current density. | (10 Marks) |
| | b. Explain the motion of electron in band theory. | (10 Marks) |

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification: appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.