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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute)

Affiliated to Dr. A.P.J. Abdul Kalam Technical University, Uttar Pradesh, Lucknow)

B.Tech.

SEM: I - THEORY EXAMINATION (2021 - 2022)

Subject: Physics for Computing Science

Time: 03:00 Hours

Max. Marks: 50

## General Instructions:

- All questions are compulsory. It comprises of three Sections A, B and C.
  - Section A - Question No- 1 is objective type question carrying 1 mark each & Question No- 2 is very short type questions carrying 2 marks each.
  - Section B - Question No- 3 is Long answer type - I questions carrying 5 marks each.
  - Section C - Question No- 4 to 8 are Long answer type - II questions carrying 4 marks each.
  - No sheet should be left blank. Any written material after a Blank sheet will not be evaluated/checked.

## SECTION A

15

## 1. Attempt all parts:-

- |      |  |   |
|------|--|---|
| 1.a. | In SHM restoring force is proportional to which quantity? (CO1)  | 1 |
|      | <ol style="list-style-type: none"> <li>Velocity</li> <li>Acceleration</li> <li>Displacement</li> <li>None</li> </ol>   |   |
| 1.b. | Fringes in diffraction pattern are of (CO2)  | 1 |
|      | <ol style="list-style-type: none"> <li>unequal width</li> <li>equal width</li> <li>equal intensity</li> <li>none</li> </ol>  |   |
| 1.c. | de-Broglie wavelength of a body of mass $m$ and kinetic energy $E$ is given by (CO3)   | 1 |
|      | <ol style="list-style-type: none"> <li><math>h/\sqrt{2mE}</math></li> <li><math>h/2mE</math></li> <li><math>\sqrt{2mE}/h</math></li> <li><math>h/mE</math></li> </ol>  |   |
| 1.d. | For a simple cubic cell having lattice constant 1 unit and Miller indices (100), the interplanar spacing will be... (CO4)  | 1 |
|      | <ol style="list-style-type: none"> <li>1 unit</li> <li>2 unit</li> <li>3 unit</li> <li>4 unit</li> </ol>   |   |
| 1.e. | Equation of the first law of thermodynamics is (CO5)   | 1 |
|      | <ol style="list-style-type: none"> <li>Internal Energy = Heat added into work done</li> <li>Internal Energy = Heat rejected into work done</li> <li>Internal Energy = Heat added divided by work done</li> </ol> |   |

4. Internal Energy = Heat added plus work done

2. Attempt all parts:-

- |      |  |   |
|------|--|---|
| 2.a. | Write the properties of SHM? (CO1)                     | 2 |
| 2.b. | Write Brewster's law equation? (CO2)                   | 2 |
| 2.c. | What is de-Broglie's hypothesis of matter waves? (CO3) | 2 |
| 2.d. | Explain lattice and basis. (CO4)                       | 2 |
| 2.e. | What is zeroth law of thermodynamics? (CO5)            | 2 |

SECTION B

15

3. Answer any three of the following:-

- |      |  |   |
|------|--|---|
| 3.a. | Discuss underdamped harmonic motion. Find the expression for the average total energy in underdamped condition. (CO1)  | 5 |
| 3.b. | Write short notes on Interference, diffraction, polarization of light and double refraction. (CO2)   | 5 |
| 3.c. | Calculate the energy difference between the ground state and first excited state for electron in one dimensional rigid box of length $10^{-8}$ cm. Mass of electron = $9.1 \times 10^{-31}$ kg and $h = 6.62 \times 10^{-34}$ j-sec. (CO3) | 5 |
| 3.d. | Calculate the atomic packing factor for simple cubic, body centered and face centered cubic lattice. (CO4)   | 5 |
| 3.e. | Discuss various types of optical fiber with diagram. (CO5)   | 5 |

SECTION C

20

4. Answer any one of the following:-

- |      |  |   |
|------|--|---|
| 4-a. | Derive the equation of continuity. (CO1)                       | 4 |
| 4-b. | Write all four Maxwell's equations in differential form. (CO1) | 4 |

5. Answer any one of the following:-

- |      |   |   |
|------|---|---|
| 5-a. | How to produced circularly polarized light? (CO2)                           | 4 |
| 5-b. | Explain why the center of Newton's rings is dark in reflected region. (CO2) | 4 |

6. Answer any one of the following:-

- |      |   |   |
|------|---|---|
| 6-a. | Calculate the velocity and kinetic energy of a neutron having de-Broglie wavelength $1 \text{ \AA}$ . (CO3) | 4 |
| 6-b. | Calculate the uncertainty in the velocity of an electron which is confined in a $10 \text{ \AA}$ box. (CO3) | 4 |

7. Answer any one of the following:-

- |      |  |   |
|------|--|---|
| 7-a. | Iron exhibit BCC with atomic radius $0.124 \text{ nm}$ . Calculate the value of lattice constant 'a' for the unit cell. (CO4)                                    | 4 |
| 7-b. | Deduce the Miller indices of a plane which cuts off intercepts in the ratio $1a:3b:-2c$ along the three co-ordinate axes where a , b and c are primitives. (CO4) | 4 |

8. Answer any one of the following:-

- |      |  |   |
|------|--|---|
| 8-a. | Explain the construction of Ruby laser with neat and clean diagram. (CO5)                  | 4 |
| 8-b. | What do you understand by entropy? What does the second law of thermodynamics tells? (CO5) | 4 |