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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech I Year II Semester Supplementary Examinations February-2022

SEMICONDUCTOR PHYSICS

(Common to ECE, CSE & CSIT)

Time: 3 hours

Max. Marks: 60

PART-A

(Answer all the Questions 5 x 2 = 10 Marks)

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|---|---|---|----|
| 1 | a | Write the merits of quantum free electron theory. | 2M |
| | b | List any two applications of pn-junction diode. | 2M |
| | c | Mention the applications of photodiode. | 2M |
| | d | Recall the basic principle involved in the optical fiber to propagate the light signal. | 2M |
| | e | Give the advantages of sol-gel process. | 2M |

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

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|---|---|--|----|
| 2 | a | Describe the existence of forbidden bands in solids using E-K diagram. | 5M |
| | b | Explain the Fermi-Dirac distribution function. How it varies with temperature. | 5M |

OR

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|---|---|--|----|
| 3 | a | Distinguish between classical free electron theory and quantum free electron theory. | 5M |
| | b | Derive the expression for effective mass of an electron in periodic potential. | 5M |

UNIT-II

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|---|---|---|----|
| 4 | a | Differentiate intrinsic and extrinsic semiconductors. | 5M |
| | b | Obtain the expression for electrical conductivity in intrinsic semiconductor. | 5M |

OR

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|---|---|---|----|
| 5 | a | State and explain Hall effect. Give its applications. | 5M |
| | b | Explain the formation of pn-junction. | 5M |

UNIT-III

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| 6 | a | Summarize the construction and working mechanism of solar cell. | 5M |
| | b | Elaborate principle and characteristics of PIN diode. | 5M |

OR

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| 7 | a | What are the characteristics of a solar cell. | 5M |
| | b | List the applications of LED and photodiode. | 5M |

UNIT-IV

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| 8 | a | Explain the difference between spontaneous and stimulated emission of radiation. | 5M |
| | b | Summarize the construction and working of diode laser with neat diagram. | 5M |

OR

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| 9 | a | Write a short note on attenuation in optical fiber. | 5M |
| | b | Describe the optical fiber communication system. | 5M |

UNIT-V

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| 10 | a | Explain the ball milling method for synthesis of nanomaterials. | 6M |
| | b | Write the advantages of sol-gel process. | 4M |

OR

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| 11 | a | What are allotropes? Write allotropes of carbon. | 5M |
| | b | Define the terms condensation, crystal growth and calcination. | 5M |

END