Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec – 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **14EC2002** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ELECTRON DEVICES** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | | | | **Course outcome** | **Marks** |
| **PART-A (40X1=40 MULTIPLE CHOICE QUESTIONS)** | | | | | | |
| 1. | The conductivity of an extrinsic semiconductor | | | | CO1 |  |
|  | a. increases with temperature | b. decreases with temperature | c.remains constant with temperature | d.none |  | (1) |
| 2. | For silicon the forbidden gap is | | | | CO1 |  |
|  | a. 0.25ev | b.1.1ev | c.0.5ev | d.15ev |  | (1) |
| 3. | Fermi energy level for n-type extrinsic semic onductors lies | | | | CO1 |  |
|  | a.close to conduction band | b. at middle of the band gap | c.close to valence band | d.can be anywhere |  | (1) |
| 4. | Semiconductor has ------------ temperature coefficient of resistance | | | | CO1 |  |
|  | a. negative | b.positive | c.zero | d.none of the above |  | (1) |
| 5. | The ratio of impurity atoms to intrinsic semiconductor atoms in an extrinsic semiconductor is about. | | | | CO1 |  |
|  | a. 1:105 | b. 1:103 | c. 1:108 | d. 1:102 |  | (1) |
| 6. | P type semiconductor is formed by adding----------- impurity with intrinsic  semiconductor | | | | CO1 |  |
|  | a. Bivalent | b.pentavalent | c.trivalent | d.none |  | (1) |
| 7. | Drift current in the semiconductor depends on | | | | CO2 |  |
|  | a. Only the electric field | b. Only the carrier concentration gradient | c. Both the electric field and concentration gradient | d. none |  | (1) |
| 8. | P type compensated semiconductor occurs when | | | | CO2 |  |
|  | a. Nd <<Na | b. Nd =Na | c. Nd >>Na | d. Nd =Na  /2 |  | (1) |
| 9. | In a semiconductor , current conduction is due to | | | | CO1 |  |
|  | a. only to holes | b.only to electrons | c. holes and free electrons | d.none |  | (1) |
| 10. | What is the state of an ideal diode during forward bias? | | | | CO1 |  |
|  | a. A short circuit | b. An open circuit | c. Unpredictable | d.undefined |  | (1) |
| 11. | How many junctions in a PN diode | | | | CO1 |  |
|  | a. single | b.double | c.triple | d.none |  | (1) |
| 12. | Electric field strength related to hall voltage is given by | | | | C03 |  |
|  | a. VHd | b. VH+d | c. VHE | d.VH / d |  | (1) |
| 13. | When a reverse bias is applied to a diode, it will | | | | CO3 |  |
|  | a. Raise the potential barrier | b. Lower the potential barrier | c. Increases the majority-carrier current greatly | d.none |  | (1) |
| 14. | A pn junction acts as a ---------- | | | | CO2 |  |
|  | a. Controlled switch | b. bidirectional switch | c. unidirectional switch | d. none of the above |  | (1) |
| 15. | Continuity equation governs functional relationship between carrier concentration, time and ----------- | | | | CO3 |  |
|  | a. voltage | b. current | c. distance | d. electric field |  | (1) |
| 16. | The capacitive effect occurs under forward biased pn junction is known as | | | | CO1 |  |
|  | a. transition capacitance | b. diffusion capacitance | c. storage capacitance | d. none of the above |  | (1) |
| 17. | The application of pn junction diode --------- | | | | CO2 |  |
|  | a. rectifier | b.amplifier | c.oscillator | d. regulator |  | (1) |
| 18. | If the arrow of crystal diode symbol is positive with respect to bar ,then diode is --------biased | | | | CO1 |  |
|  | a. forward | b.reverse | c.either forward or reverse | d.none |  | (1) |
| 19. | Continuity equation governs functional relationship between carrier concentration, distance and ----------- | | | | CO3 |  |
|  | a. voltage | b. current | c. time | d. electric field |  | (1) |
| 20. | Hall effect is used to determine | | | | CO3 |  |
|  | a. conductivity | b.carrier concentration | c.mobility | d.All the above |  | (1) |

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| 21. | Junction Field Effect Transistor is a --------------------- | | | | CO1 |  |
|  | a. current controlled device | b.voltage controlled device | c.power controlled device | d.none |  | (1) |
| 22. | β is the symbol of current gain for -------- | | | | CO3 |  |
|  | a. common-base mode | b. common-emitter mode | c. common-collector mode | d.None |  | (1) |
| 23. | In a transistor,-------------------------- | | | | CO3 |  |
|  | a. IC=IE+IB | b. IB=IC+IE | c. IE=IC+IB | d. IC=IB-IE |  | (1) |
| 24. | Find the value of collector current of a CE configuration whose current amplification factor is 0.98 and base current is 1mA. | | | | CO2 |  |
|  | a. 0.98mA | b.1mA | c.0.08mA | d.0.8mA |  | (1) |
| 25. | The input characteristics of a transistor is drawn between input voltage and input current by keeping ---------------------------- constant | | | | CO2 |  |
|  | a.output current | b.output voltage | c.input current | d.Input and output current |  | (1) |
| 26. | FET operation depends only on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_charge carriers. | | | | CO2 |  |
|  | a.majority | b.minority | c.majority and Minority | d.none |  | (1) |
| 27. | Enhancement mode MOSFET can be operated in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_mode only. | | | | CO2 |  |
|  | a. enhancement | b. depletion | c. both enhancement and depletion | d.none |  | (1) |
| 28. | The channel of a JFET is between the -------------- | | | | CO2 |  |
|  | a. gate and drain | b.drain and source | c.gate and source | d.input and output |  | (1) |
| 29. | The UJT may be used as ---------------- | | | | CO2 |  |
|  | a.an amplifier | b.relaxation oscillator | c.a rectifier | d.regulator |  | (1) |
| 30. | Which of the following is a characteristics of UJT? | | | | CO2 |  |
|  | a. positive resistance | b.negative resistance | c.inverse resistance | d.none |  | (1) |
| 31. | What does LED stand for? | | | | CO2 |  |
|  | a.light emitting display | b. light emitting diode | c. light emitting detector | d.light energy diode |  | (1) |
| 32. | DIAC is a \_\_\_\_\_\_\_\_ silicon device. | | | | CO2 |  |
|  | a. three layer two terminal | b. two layer two terminal | c.four layer two terminal | d.none |  | (1) |
| 33. | LED glows only in ------------- | | | | CO2 |  |
|  | a. reverse biased | b. forward biased | c.both forward and reverse biased | d.none |  | (1) |
| 34. | The other name of tunnel diode is ------ | | | | CO2 |  |
|  | a.shockley diode | b.zener diode | c.esaki diode | d.light emitting diode |  | (1) |
| 35. | The different terminals in TRIAC is | | | | CO2 |  |
|  | a. emitter, base, collector | b. main terminal-I, main terminal-II, gate | c.anode ,cathode,gate | d.gate,source,drain |  | (1) |
| 36. | A bidirectional thyristor is the ------- | | | | CO2 |  |
|  | a. UJT | b.TRIAC | c.SCR | d.JFET |  | (1) |
| 37. | A pn junction that radiates energy as light instead of heat is called | | | | CO2 |  |
|  | a. PN diode | b.Zener diode | c.LED | d.tunnel diode |  | (1) |
| 38. | Materials used in manufacturing LED | | | | CO2 |  |
|  | a. Silicon and Germanium | b. Gallium, Arsenic and Phosphide | c. Both (a) and (b) | d.none |  | (1) |
| 39. | Which device is used as a voltage regulator? | | | | CO2 |  |
|  | a. PN diode | b.tunnel diode | c.zener diode | d.none |  | (1) |
| 40. | Which of the following is not have a control device? | | | | CO2 |  |
|  | a. SCR | b.TRIAC | c.DIAC | d.none |  | (1) |

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| **PART B(8 X 5 = 40 MARKS) (ANSWER ANY EIGHT)** | | | |
| 41. | Draw the energy band diagram based on fermi-dirac probability distribution for n-type extrinsic semiconductor and p-type extrinsic semiconductor. Express the notations in detail. | CO1 | (5) |
| 42. | Calculate the thermal equilibrium hole concentration in Silicon at T=400K. Assume the fermi energy is 0.27eV above the valence band energy. The value of Nv for Si at T=300K is 1.04x1019 cm-3. | CO3 | (5) |
| 43. | Calculate the silicon diode current for the forward bias voltage of 0.6V at room temperature,if the reverse saturation current is 10 µA. | CO3 | (5) |
| 44. | Define Hall effect. Mention its applications. | CO3 | (5) |
| 45. | Compare JFETand MOSFET. | CO2 | (5) |
| 46. | Give the VI characteristics of UJT. | CO2 | (5) |
| 47. | Draw the energy band structure of open circuited pn junction and write the expression for potential energy(E0). | CO2 | (5) |
| 48. | Draw the symbol and construction diagram of Depletion MOSFET. | CO2 | (5) |
| 49. | Describe tunning phenomenon. | CO2 | (5) |
| 50. | Draw the symbol and VI characteristic of zener diode. | CO3 | (5) |
| **PART C( 2 X 10 = 20 MARKS) (ANSWER ANY TWO)** | | | |
| 51. | With neat diagrams, explain the operation, input and output characteristics of a NPN  transistor in CB configuration. | CO2 | (10) |
| 52. | Derive the expression for electron concentration (n0) in intrinsic semiconductor under thermal equilibrium conditions. | CO3 | (10) |
| 53. | Compare SCR and TRIAC.Explain the operation of SCR. | CO2 | (10) |

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