Register Number: ……………………..

## B.E DEGREE EXAMINATIONS: JUNE2013

Second Semester

## ELECTRONICS AND COMMUNICATION ENGINEERING

ECE102: Electron Devices

**Time: Three Hours** **Maximum Marks: 100**

### Answer all the Questions:-

### PART A (10 x 1 = 10 Marks)

1. The path of an electron in uniform magnetic field is
   - a) Parabolic
   - b) Circular
   - c) Straight line
   - d) Square
2. The speed of an electron after it has moved through a potential difference of 5000V is……………..
   - a) 5000 m/s
   - b) $4.2 \times 10^7$ m/s
   - c) 500 m/s
   - d) $2500 \times 10^{6}$ m/s
3. The forbidden energy gap for Silicon is……….
   - a) 1 eV
   - b) 0.6 eV
   - c) 1.1 eV
   - d) 1.3 eV
4. The expression for Fermi dirac probability function is……….
   - a) $f(E) = 1 / 1+ e^{(E - E_F) / kT}$
   - b) $f(E) = 1 / 1+ e^{(E - E_F)}$
   - c) $f(E) = 1 / 1- e^{(E - E_F) / kT}$
   - d) $f(E) = 1 / e^{(E - E_F) / kT}$
5. The depletion region within a PN junction is reduced when the junction has
   - a) Zero bias
   - b) Forward bias
   - c) Reverse bias
   - d) all of these
6. The diffusion or storage capacitance is given by…………….
   - a) $C_D = \tau I / \eta V_T$
   - b) $C_D = \tau I / \eta$
   - c) $C_D = \eta V_T / \tau I$
   - d) $C_D = \tau I \eta / V_T$
7. In a Common Base connection, if the emitter current is 5.8mA and the collector current is 5.6mA then the value of $\alpha$ is………………
   - a) 0.95
   - b) 0.966
   - c) 0
   - d) 1
8. The gate-to-source voltage at which the drain current becomes zero is called……………
   - a) Pinch-off voltage
   - b) Saturation voltage
   - c) Cut-off voltage
   - d) Breakdown voltage

9. The operating voltage range of LED is……….

| | |
|---|---|
| a) above 10 V | b) 5 to 10V |
| c) 1.5 to 2.5V | d) less than 1 V |

10. Two PNPN diodes connected in parallel but in opposite direction is a

| | |
|---|---|
| a) TRIAC | b) DIAC |
| c) SCR | d) UJT |

## PART B (10 x 2 = 20 Marks)

11. State coulomb's law.

12. Calculate the maximum velocity of the beam of electrons in a CRT having anode voltage of 800 V. Charge of electrons is 1.6 x $10^{-19}$C and mass of the electrons is 9.1x$10^{-31}$ kg.

13. Sate Mass action law.

14. Give the expression for the Fermi level in an N type semiconductor.

15. How the barrier potential exists in a PN junction.

16. Mention the expression for diode current equation.

17. What is early effect?

18. What is the effect of gate-to-source voltage on drain characteristics?

19. Draw the two transistor model of a DIAC.

20. List the features of LED.

## PART C (5 x 14 = 70 Marks)

21. a) (i) State the expression of force in both electric field and magnetic field. (4)

(ii) Explain the two dimensional motion of an electron in uniform electric field and obtain the expression. (10)

**(OR)**

b) (i) Derive the expression for Electrostatic deflection sensitivity. (10)

(ii) In a CRT employing Magnetic deflection, the distance from the screen to the centre of the plates is 24 cm. The length of the field along the axis is 4 cm. Calculate the magnetic flux density required to produce a deflection of 1.2 cm on the screen for the final anode voltage of 600 volts. (4)

22. a) What is an intrinsic semiconductor? Derive the expression for the electron and hole concentration in an intrinsic semiconductor.

**(OR)**

b) Derive the continuity equation and also discuss the three special cases of continuity equation.

23. a) Explain the energy band structure of open circuited PN junction and also derive the expression for contact potential $V_o$.

**(OR)**

b) What is meant by transition capacitance and derive the expression for the same.

24. a) (i) Draw and explain the input and output characteristics of Common Emitter configuration of BJT. (10)

(ii) Compare CE, CB and CC configurations of BJT. (4)

**(OR)**

b) Explain the construction, operation and characteristics of P-channel MOSFET with neat diagrams.

25. a) (i) Describe the construction and operation of SCR and explain its characteristics with neat sketch. (10)

(ii) Mention the applications of TRIAC. (4)

**(OR)**

b) (i) Explain the operation and characteristics of UJT with neat diagrams and derive the intrinsic standoff ratio. (10)

(ii) Write short note on photo diode. (4)

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