Register Number.....

B.E. DEGREE EXAMINATIONS: OCTOBER/NOVEMBER-2008

Third Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U07EE304: Electronic Devices

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

Answer ALL Questions: -

Part A (20 × 1 = 20 Marks)

1. The cut-in voltage for Si diode is approximately.
   (A) 0.2 V, (B) 0.6 V, (C) 1.1 V, (D) 0.9 V
2. In the forward biased PN diode, the equation relating the diffusion current I and the injected excess minority carrier charge Q stored in the device is
   (A) $I=Q/\tau_P$, (B) $I=Q\,\tau_P$, (C) Q^2/τ_P, (D) I=Q/V
3. When the diode is reverse biased, it is equivalent to
   (A) An OFF switch, (B) An ON switch,
   (C) A high resistance, (D) A low resistance
4. The resistance of a diode is equal to
   (A) Ohmic resistance of the P- and N- semiconductors, (B) Junction resistance,
   (C) Algebraic sum of (A)& (B) above, (D) Reverse resistance
5. When the collector junction in transistors is biased in the reverse direction and emitter junction in the forward direction, the transistor is said to be in the
   (A) Active region, (B) cut-off region,
   (C) Saturation region, (D) intermittent region
6. The reverse saturation current is the current that flows when
   (A) The potential barrier is zero,
   (B) Only majority carriers are crossing the junction,
   (C) Only majority carriers are crossing the junction,
   (D) The junction is unbiased
7. In a transistor with normal bias, the emitter junction
   (A) Has a high resistance, (B) is biased with the emitter positive with respect to the base,
   (C) has a low resistance, (D) emits majority carriers into the base region
8. The main current crossing the collector junction in a normally biased n-p-n transistor is
   (A) a diffusion current,(B) a drift current,(C) a hole current,(D)equal to the base current
9. A field-effect transistor operates on
   (A) Majority carriers only, (B) Minority carriers only,
   (C) Positively charged ions only, (D) Negatively charged ions only

10. For the operation of depletion-type MOSFET, the gate voltage has to be

(A) Low positive, (B) High positive, (C) High negative, (D) Zero

11. In JFET operating above pinch-off voltage, the

(A) Drain current remains practically constant. (B) Drain current starts decreasing,

(C) Drain current increases rapidly, (D) Depletion region becomes smaller

12. The N-channel MOSFET devices are preferred more than P-channel's because

(A) N-channel devices are faster than P-channel devices,

(B) N-channel devices consumes less power than P-channel devices,

(C) N-channel devices has higher packing density than P-channel devices,

(D) Both (A) and (C) above

13. A semiconductor photo-diode uses

(A) Photo-emissive effect, (B) photovoltaic, (C) photoconductive, (D) both (A) & (C)

14. With a phototransistor

(A) No voltage is applied, (B) the light is incident on the collector junction,

(C) The active area is large, (D) the base electrodes is connected to the emitter

15. Photoconductive cell most popularly used for visible light spectrum uses

(A) Ge, (B) Si, (C) Ga As, (D) Cadmium sulphide

16. The light-emitting diode (LED),

(A) Is usually made from silicon,

(B) Uses a reverse-biased junction,

(C) Gives a light output which increases with the increase in temperature,

(D) Depends on the recombination of holes and electronics

17. Piezo-resistance is

(A) A change in resistance due to change in magnetic field,

(B) A change in resistance due to change in pressure,

(C) A change in resistance due to change in temperature,

(D) Emission of light

18. The triac

(A) Is a three-layer device, (B) depends on self-breakover,

(C) Always uses positive gating pulses; (D) is a gated symmetrical switch

19. The device associated with voltage-controlled capacitance is a

(A) Light-emitting diode, (B) Photodiode, (C) Varactor Diode, (D) Zener diode

20. In an SCR, the breakover voltage V_{BO}

(A) In independent of gate current,

(B) Increases with the increase of positive gate current,

(C) Decreases with the increase of positive gate current,

(D) May increase or decrease with increase of gate current depending on temperature

Part B (5 × 16 = 80 Marks)

21. a. (i) Describe the operation of PN junction diode with its VI characteristic and also write the diode current equation. (12)

(ii) Which are the two effects responsible for reverse breakdown? Explain. (4)

(OR)

b. (i) Derive the expression for Diffusion capacitance of a PN Junction diodes. (8)

(ii) Discuss the temperature effect of PN Junction diodes. (8)

22. a. (i) Explain the operation of a CE configuration and Draw the hybrid parameters of a transistor in CE configuration and discuss about each component of the model. (12)

(ii) Write a note on power transistors. (4)

(OR)

b. (i) Describe the various current components in a transistor. (8)

(ii) Explain the three regions of output characteristics of a transistor in CE configuration. (8)

23. a. (i) Describe the construction and working principle of JFET. (10)

(ii) Explain the V-I characteristics of unijunction transistor. (6)

(OR)

b. (i) With a help of neat diagram, explain the operation of an n-channel enhancement type MOSFET. (10)

(ii) Explain the performance of FET as a voltage variable resistor. (6)

24. a. (i) Discuss the operation and characteristics of opto-coupler. (8)

(ii) Write a detailed note on solar cell. (8)

(OR)

b. (i) Explain the construction and operation of LED. (8)

(ii) Illustrate the concept of photo emissivity and photo conductivity with examples. (8)

25. a. (i) What is Piezo electric effect? Explain with an example. (8)

(ii) What is Zener breakdown and avalanche breakdown? Explain the chacteristics of Zener diode. (8)

(OR)

b. (i) Explain the construction, characteristics of tunnel diodes. Mention some of the applications of tunnel diodes. (16)

****