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Question Paper Code: 41241

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2016

Second Semester

Electronics and Communication Engineering

14UEC207 - ELECTRONIC DEVICES

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Conduction electrons have more mobility than holes because they

   (a) are lighter
   (b) experience collision less frequently
   (c) have negative charge
   (d) need less energy to move them

2. With an increase in temperature the fermi level in an intrinsic semiconductor decreases. This is because with the increase of temperature

   (a) Both the carrier concentration and mobility of carrier decreases
   (b) The carrier concentration increases but mobility of carrier decreases
   (c) The carrier concentration decreases but the mobility of carrier increases
   (d) The carrier concentration remains the same but the mobility of carrier decreases

3. In a p^+n junction diode under reverse bias, the magnitude of electric field is maximum at

   (a) The edge of the depletion region on the p-side
   (b) The edge of the depletion region on the n-side
   (c) The p^+n junction
   (d) The centre of the depletion region on the n-side

4. Silicon is preferred for manufacturing Zener diode because it

   (a) is relatively cheap
   (b) needs lower doping level
   (c) has higher temperature and current capacity
   (d) has lower breakdown voltage

5. An emitter in a bipolar junction transistor is doped much more heavily than the base as it increases the

   (a) emitter efficiency
   (b) base transport factor
   (c) forward current gain
   (d) all the three given above

6. While using a BJT as an amplifier, the collector and emitter terminals get interchanged mistakenly. Assuming that the amplifier of common emitter amplifier the biasing is suitably adjusted, the interchange of terminals will result into which one of the following?

   (a) Zero gain
   (b) Infinite gain
   (c) Reduced gain
   (d) No change in gain at all

7. The action of a JFET in its equivalent circuit can best be represented as a

   (a) Current controlled current source
   (b) Current controlled voltage source
   (c) Voltage controlled voltage source
   (d) Voltage controlled current source

8. The effective channel length of a MOSFET in saturation decreases with increase in

   (a) Gate voltage
   (b) Drain voltage
   (c) Source voltage
   (d) Body voltage

9. A PIN diode is frequently used as a

   (a) Peak clipper
   (b) Voltage regulator
   (c) Harmonic generator
   (d) Switching diode for frequencies up to GHz range

10. In a tunnel diode, the width of the depletion layer is of the order of

    (a) 0.1 micron
    (b) 1.0 micron
    (c) 0.1 Armstrong
    (d) 100 Armstrong

PART - B (5 x 2 = 10 Marks)

11. Define mass action law.

12. What is Zener voltage?

13. Why CE configuration is widely used in amplifier circuits? Give reason.

14. Distinguish BJT and FET.

15. List the applications of tunnel diodes.

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Prove that the conductivity of semiconductor is given by $\sigma = q(n\mu_e + p\mu_h)$. (12)

(ii) Explain the difference between metals, insulators and semiconductors. (4)

Or

(b) Derive the expression for carrier concentration in intrinsic semiconductors. (16)

17. (a) (i) Discuss the physics of a PN junction diode and analyze it when it is forward and reverse biased. (12)

(ii) What are the limitations in the operating conditions of the PN junction. (4)

Or

(b) (i) With the help of a circuit diagram explain the working of a half-wave rectifier. Also draw the necessary waveforms. Also obtain the expression for the ripple factor and efficiency of rectification. (12)

(ii) Show that rectification efficiency for a half wave rectifier is 40.6%. (4)

18. (a) Explain the different components of currents flowing through the structure of a N-P-N transistor. How the emitter injection efficiency and base transport factor influence the amplification factor? (16)

Or

(b) Explain the transistor characteristics in CE configurations. Explain the behavior of the transistor in active, cut-off and saturation mode. (16)

19. (a) Why JFET is called voltage controlled device? Draw the structure and output characteristics of P-channel JFET. Indicate different regions in the characteristics and explain its significance. (16)

Or

(b) What is the significant difference between the construction of an enhancement type MOSFET and depletion type MOSFET? Explain with suitable diagrams. (16)

20. (a) Draw and describe the principle of operation and characteristics of SCR. (16)

Or

(b) Write short notes on

(i) Phototransistor

(ii) LED

(iii) LCD (16)
