Reg. No. : | | | | | | | | | | |

Question Paper Code: 53115

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Third Semester

Biomedical Engineering

15UBM305 - SEMICONDUCTOR DEVICES AND CIRCUITS

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. At room temperature the current in an intrinsic semiconductor is due to

   (a) holes (b) electrons (c) ions (d) Holes and Electrons

2. The most commonly used semiconductor material is

   (a) silicon (b) germanium
   (c) mixture of silicon and germanium (d) none of these

3. For an n-channel enhancement type MOSFET, if the source is connected at a higher potential than that of the bulk ($V_{SB} > 0$), the threshold voltage V_T of the MOSFET will

   (a) remain unchanged (b) decrease
   (c) change Polarity (d) increase

4. Which of the following is used for generating time varying wave forms?

   (a) MOSFET (b) PIN diode
   (c) Tunnel diode (d) UJT

5. Pulse stretching, time-delay, and pulse generation are all easily accomplished with which type of multivibrator circuit?

   (a) astable (b) monostable
   (c) multistable (d) bistable

6. An astable multivibrator requires

   (a) balanced time constants (b) a pair of matched transistors
   (c) no input signal (d) dual J-K flip-flops

7. Only the condition = _____ must be satisfied for self-sustained oscillations to result.

(a) 0 (b) -1 (c) 1 (d) none of these

8. The feedback signal in a(n) _____ oscillator is derived from an inductive voltage divider in the LC circuit.

(a) Hartley (b) Armstrong (c) Colpitts (d) RC Phase shift

9. Class _____ amplifiers are normally operated in a push-pull configuration in order to produce an output that is a replica of the input.

(a) A (b) B (c) C (d) AB

10. What is the maximum efficiency of a class A circuit with a direct or series-fed load connection?

(a) 90% (b) 78.5% (c) 50% (d) 25%

PART - B (5 x 2 = 10 Marks)

11. Distinguish between avalanche break down and Zener break down.

12. What does UJT stand for? Justify the name UJT.

13. Mention the use of Schmitt trigger circuit.

14. List the advantages of negative feedback amplifiers.

15. Draw the hybrid small signal model of common base configuration. Define four hybrid parameters.

PART - C (5 x 16 = 80 Marks)

16. (a) Explain the operation of common emitter connection of transistor with its characteristics. (16)

Or

(b) Explain the working of Zener diode and draw its V-I characteristics. (16)

17. (a) With the help of suitable diagram explain working of Depletion MOSFET. (16)

Or

(b) Describe the operation of UJT as a relaxation oscillator and derive its frequency of oscillation. (16)

18. (a) Explain the operation and working principle of monostable multivibrators with necessary diagram. (16)

Or

(b) Explain the operation of a full wave rectifier circuit with various parameters that govern its performance. (16)

19. (a) Explain in detail the Voltage series feedback connection and Current shunt feedback connection of amplifiers. (16)

Or

(b) Explain with neat diagram, the working of Hartley oscillator using transistor. Derive an expression for frequency of oscillation. (16)

20. (a) Derive the expression for current gain, input impedance and voltage gain of a CE transistor amplifier. (16)

Or

(b) Explain the operation of a class B amplifier with neat diagram. Derive the expression for its maximum efficiency. Mention its drawback and the methods to overcome it. (16)

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