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

Question Paper Code: 43305

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

Third Semester

Electrical and Electronics Engineering

14UEE305 - SEMICONDUCTOR DEVICES AND CIRCUITS

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The theoretical maximum conversion efficiency of full wave rectifier is

   (a) 81.2% (b) 76% (c) 67% (d) 40.6%

2. LEDs have response time of the order of

   (a) 0.1ns (b) 1ns (c) 100ns (d) 1μs

3. Calculate beta (β) of a transistor when alpha (α) = 0.98

   (a) 49 (b) 37 (c) 97 (d) 51

4. When does a transistor act as a switch?

   (a) Operated in linear region (b) Operated in cut off region
   (c) Operated in saturation region (d) Operated in cut off and saturated region

5. For the operation of N channel E-MOSFET it is necessary that gate voltage is

   (a) highly negative (b) highly positive
   (c) low positive (d) zero

6. The dynamic drain resistance of MOSFET is of the order of

(a) 10 *KΩ* (b) 500 *KΩ* (c) 5 *MΩ* (d) 100 *MΩ*

7. In Colpitts oscillator, the amplifier voltage gain usually has to be substantially larger than

(a) *C2* (b) *C1* (c) *C1/C2* (d) *C2/C1*

8. The amplitude stabilizes itself for which the loop gain for the fundamental is reduced to

(a) zero (b) unity (c) both a and b (d) none of these

9. A clamper circuit affects the peak to peak and rms vale of waveform in

(a) Increases both (b) Decreases both
(c) No change (d) Increases peak to peak value and decreases rms value

10. Effect of hysteresis is to

(a) Improve noise immunity (b) Increase response time
(c) Reduce noise immunity (d) High sensitivity

PART - B (5 x 2 = 10 Marks)

11. What is diffusion current in p-n junction diode?

12. What is thermal runaway in a transistor?

13. What is the advantage of Darlington connection?

14. State Bharkausen's criterion for oscillation.

15. State the applications of Schmitt trigger.

PART - C (5 x 16 = 80 Marks)

16. (a) Draw the circuit diagram of half wave rectifier and explain its operation with necessary waveforms. Also derive the expression for rectification, efficiency and transformer utilization factor. (16)

Or

(b) Summarize the operation of Zener diode and its applications. (16)

17. (a) Describe the construction, operation and characteristics of BJT in common base configuration. (16)

Or

(b) Discuss in detail the analysis of BJT amplifier using h-parameters. (16)

18. (a) Explain with a neat circuit diagram JFET as an amplifier in common source mode. Sketch the V-I characteristics. Also draw its low frequency a.c. equivalent circuit. (16)

Or

(b) Discuss in detail about the fabrication, operation and characteristics of P and N-channel JFET. (16)

19. (a) Explain the different methods of coupling multistage amplifiers. (16)

Or

(b) Draw the circuit diagram of Colpitt oscillator and explain its operation. Obtain the expression for its frequency of oscillation. (16)

20. (a) Explain positive and negative clamper with suitable circuit diagrams and waveforms.(16)

Or

(b) For a certain UJT sweep circuit, the resistance is 20 K while the capacitance is 0.2 μF. The valley potential is 1.5 V when VBB = 15 V. Assuming diode cut in voltage of 0.7 V and intrinsic stand-off ratio as 0.5. Calculate the frequency of oscillations. (16)

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43305