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Question Paper Code: 43305

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

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 forward current in an PN junction is of

    (a) *A*   (b) *mA*   (c) *kA*   (d) *μA*

2. The zero level output from a series clipper circuit is

    (a) exactly zero   (b) exactly one   (c) not exactly one   (d) not exactly zero

3. In optocoupler, which allows a low voltage dc source to control high voltage circuit?

    (a) output detector   (b) electric isolation
    (c) current transfer ratio   (d) output isolation

4. Which of the following change is likely to occur in the Q-point when the collector current increases?

    (a) no change   (b) shifts to saturation region
    (c) shifts to cut-off region   (d) oscillates in the active region

5. n-channel FETs are superior to p-channel FETs because

      (a) they have lower switching time

      (b) they have lower pinch off voltage

      (c) mobility of charge carrier electron in n-channel FET is greater than the mobility of charge carrier hole in p-channel FET

      (d) they have higher input impedance

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

      (a) 10 $K\Omega$ (b) 500 $K\Omega$ (c) 5 $M\Omega$ (d) 100 $M\Omega$

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. In UJT, a 3-mil aluminum wire called the

      (a) base B (b) emitter E (c) base $B1$ & $B2$ (d) all of these

10. A circuit that adds positive or negative DC voltage to an input sine wave is called

      (a) clamper   (b) clipper   (c) diode clamp   (d) limiter

PART - B (5 x 2 = 10 Marks)

11. List some disadvantages of half wave rectifier.

12. Give the relationship between α and β.

13. Draw the block diagram of multistage amplifier with n number of stages.

14. State the condition to produce oscillation.

15. State the applications of Schmitt trigger.

PART - C (5 x 16 = 80 Marks)

16. (a) With neat diagram explain shunt and series regulators.   (16)

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

17. (a) Describe the input and output characteristics of a transistor in Common Emitter (CE) configuration and also derive its current relation. (16)

Or

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

18. (a) (i) Derive the expression for output impedance and voltage gain for a common drain amplifier circuit. (10)

(ii) Draw a small signal low frequency model for a FET and explain it. (6)

Or

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

19. (a) Derive the input resistance and output resistance for voltage series and current series feedback amplifier. (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) Draw the circuit diagram of a monostable multivibrator and explain its operation with relevant waveforms. (16)

Or

(b) For a certain UJT sweep circuit, the resistance is $20\ K$ while the capacitance is $0.2\ \mu F$. 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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