Reg. No. :

Question Paper Code: 43305

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

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) $1\mu s$

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. Optocouplers combine

    (a) SITs and BJTs
    (b) IGBTs and MOSFETS
    (c) power transformers and silicon transistors
    (d) Infrared light emitting diode and a silicon phototransistor

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. The effect of current shunt feedback in an amplifier is

    (a) Increase the input resistance and decrease the output resistance

    (b) Increase both input and output resistance

    (c) Decrease both input and output resistance

    (d) Decrease the input resistance and increase the output resistance

8. To obtain very high input and output impedances in a feedback amplifier ,the topology must be

    (a) voltage series   (b) current series   (c) voltage shunt   (d) current shunt

9. Which multivibrator is called as free running multivibrator.

    (a) Bistable multivibrator   (b) Monostable multivibrator

    (c) Astable multivibrator   (d) Oscillator

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. How does LED emit colored light?

12. Give the relationship between α and β.

13. Write a short note of JFET fabrication and packaging.

2

14. State the condition to produce oscillation.

15. State the applications of Schmitt trigger.

PART - C (5 x 16 = 80 Marks)

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

Or

(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 construction, operation and characteristics of BJT in common base configuration. (16)

Or

(b) Define stability factor. Derive the stability factor expression for

(i) Fixed bias circuit

(ii) Collector to base bias circuit. (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) Explain the different methods of coupling multistage amplifiers. (16)

Or

(b) (i) Extend the construction and operation of opamp Colpitts oscillator. (8)

(ii) Distinguish the construction and operation of wein bridge oscillators. (8)

43305

20. (a) (i) Explain positive and negative clamper with suitable circuit diagrams and
waveforms. (8)

(ii) Explain how saw tooth waveforms are generated using UJT. (8)

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)

————————————

43305