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**Reg. No. :**

**Question Paper Code: 43035**

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

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. LEDs have response time of the order of

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

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. The common collector circuit configuration of phase shift is

(a) 90*0* (b) 180*0* (c) 360*0* (d) 0*0*

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 *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. 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. 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

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.

14. Why differential amplifier acts as a high frequency amplifier?

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)

Or

(b) 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)

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)

20. (a) Demonstrate the operation of inverting and non-inverting Schmitt trigger and its characteristics. (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)