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Question Paper Code : 21419

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Third Semester

Electronics and Instrumentation Engineering

EI 2203/EI 35/EC 1209/10133 EE 305/ 080300002 – ELECTRONIC DEVICES AND CIRCUITS

(Common to Instrumentation and Control Engineering)

(Regulation 2008/2010)

(Common to PTEI 2203 – Electronic Devices and Circuits for B.E. (Part-Time) Second Semester – Electronics and Instrumentation Engineering – Regulation 2009)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Mention the two types of junction capacitances.

2. Define thermal runaway.

3. Draw one biasing circuit for an enhancement type MOSFET.

4. Give the symbol for SCR, DIAC, and TRIAC.

5. How are amplifiers classified based on biasing condition?

6. What is crossover distortion? How it can be minimized?

7. What type of feedback is used in emitter follower circuit?

8. A Wein bridge oscillator has a frequency of 500 kHz. If the value of C is 1000 pF, determine the value of R.

9. Draw the circuit of Schmitt trigger.

10. Mention different types of filters.

PART B — (5 × 16 = 80 marks)

11. (a) (i) The reverse saturation current of a silicon PN junction diode is $10\,\mu A$. Calculate the diode current for the forward bias voltage of 0.6 Vat 25°C. (8)

(ii) Discuss the construction and applications of Schottky diode. (8)

Or

(b) (i) Draw the collector-to-base bias circuit for a transistor amplifier and obtain its stability factor. (8)

(ii) Derive the transistor equation $I_C = \beta I_B + (1+\beta) I_{CBO}$. (8)

12. (a) (i) Define the parameters trans conductance g_m drain rsistance r_d, and amplification factor μ of a JFET and establish a relation between them. (8)

(ii) Describe the construction and characteristics of n-channel D-MOSFET. (8)

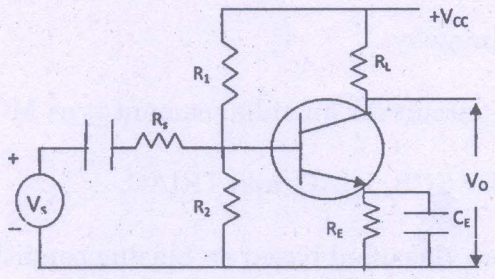
Or

(b) (i) Draw and explain the static emitter characteristics of UJT. (8)

(ii) Explain the operation and characteristics of SCR. (8)

13. (a) (i) Draw the h-parameter model of a CE transistor and define the h-parameters. (8)

(ii) For the CE amplifier shown in figure, calculate the mid frequency voltage gain and lower 3-dB point. The transistor has h-parameters life = 400 and h_{ie} = 10 kΩ. The circuit details are R_L = 5kΩ, R_S = 600Ω, R_E = 1 kΩ, V_{CC} = 12 V, R_1 = 15 kΩ, R_2 = 2.2kΩ, and C_E = 50 μF. (8)



Or

(b) (i) In a class A amplifier, $V_{CE(max)}$ = 15 V, $V_{CE(min)}$ = 1 V. Find the overall efficiency for

(1) series-fed load, (4)

(2) transformer coupled load. (4)

(ii) Derive the conversion efficiency and the relation between maximum power output and maximum power dissipation for class B push-pull power amplifier. (8)

14. (a) (i) An amplifier has a voltage gain of 400, f_1 = 50Hz, f_2 = 200 kHz and a distortion of 10% without feedback. Determine the amplifier gain, f_{1f}, f_{2f} and D_f when a negative feedback is applied with feedback ratio of 0.01. (8)

(ii) Draw the circuit of a CE amplifier with voltage-shunt feedback and explain. (8)

Or

(b) (i) Derive the expression for frequency of oscillation of RC phase shift oscillator. (10)

(ii) Draw the circuit of a crystal oscillator and explain its operation. (6)

15. (a) (i) Draw the circuit of biased positive clipper and explain with suitable waveforms. (8)

(ii) With suitable waveforms, describe the working of a bridge rectifier. (8)

Or

(b) (i) Classify multivibrators and mention their applications. (8)

(ii) Discuss the design of a zener diode voltage regulator. (8)
