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Question Paper Code : 71723

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Second/Third Semester

Electrical and Electronics Engineering

EC 6202 — ELECTRONIC DEVICES AND CIRCUITS

(Common to Biomedical Engineering, Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Medical Electronics Engineering, Robotics and Automation Engineering)

(Regulations 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Differentiate between zener breakdown and avalanche breakdown.
2. Mention some of the applications of laser diode.
3. Draw the two transistor equivalent circuit of SCR.
4. A transistor has a typical β of 100. If the collector current is 40 mA, what is the value of emitter current?
5. A common emitter amplifier has an input resistance 2.5 $k\Omega$ and voltage gain of 200. If the input signal voltage is 5mV. Find the base current of the amplifier.
6. Define an intrinsic stand off ratio of UJT and draw its equivalent circuit.
7. Compare the performances of CE and CC configuration.
8. Define a common mode rejection ratio for a differential amplifier. What is the value of CMRR for ideal cases?
9. A tuned circuit has a resonant frequency of 1600 kHz and a bandwidth of 10 kHz. What is the value of its Q factor?
10. Give the two Barkhausen conditions required for sinusoidal oscillation to be sustained.

PART B — (5 × 13 = 65 marks)

11. (a) Draw the circuit diagram and explain the working of full wave bridge rectifier with output filter and derive the expression of average output current and ripple factor. (13)

Or

(b) (i) Drive the expression for diffusion capacitance of PN junction diode. (7)

(ii) Explain how zener diode can be acts as a voltage regulator. (6)

12. (a) (i) Explain the drain and transfer characteristics of Enhancement type MOSFET. (7)

(ii) Describe the working of Silicon controlled rectifier with neat diagram. (6)

Or

(b) (i) Describe the construction and working of IGBT with neat diagram. (7)

(ii) Sketch and explain the typical shape of drain characteristics of JFET for $V_{GS} = 0$ with indication of four region clearly. (6)

13. (a) Draw the circuit diagram of a common drain MOSFET amplifier. Derive the expression for its voltage gain, input resistance and output resistance. (13)

Or

(b) Figure 13(b) shows a common-emitter amplifier. Determine the input resistance, ac load resistance, voltage gain and output voltage. (13)

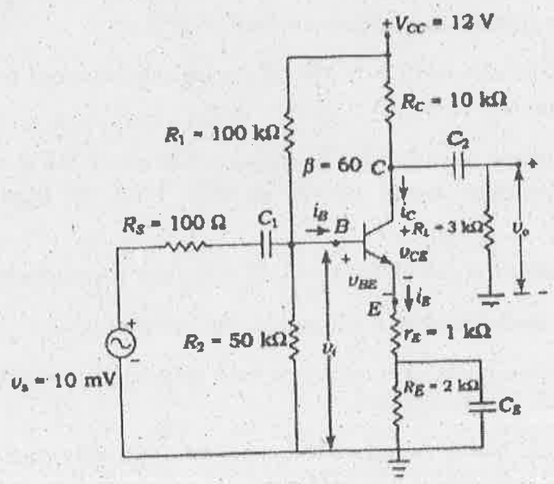

Figure 13(b)

14. (a) Draw the circuit diagram and explain the working of a differential amplifier using FET. Derive the expression for differential mode gain and common mode gain. (13)

Or

(b) Describe the working of class A and class C power amplifier in details with relevant diagrams. (13)

15. (a) With a neat block diagram, explain the operation of following feedback amplifiers.

(i) Voltage series feedback amplifier (7)

(ii) Current shunt feedback amplifier. (6)

Or

(b) Explain with neat circuit diagram, the working of Hartley oscillator using transistor. Derive an expression for frequency of oscillation. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Design an oscillator to operate at a frequency of 10 kHz which gives an extremely pure sine wave output, good frequency stability and highly stabilized amplitude. Discuss the operation of this oscillator as an audio signal generators. (15)

Or

(b) Design a voltage divider bias circuit for transistor to establish the quiescent point at $V_{CE} = 12$ V, $I_C = 1.5$ mA, stability factor $S \leq 3$, $\beta = 50$, $V_{BE} = 0.7$ V, $V_{CC} = 22.5$ V and $R_C = 5.6\ k\Omega$. (15)