B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2003.

Second Semester

Information Technology

IF 141 — ELECTRONIC DEVICES AND CIRCUITS

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. How is p–type semicondcutor formed?

2. Draw the V-I characteristics of SCR.

3. Draw the frequency response of common emitter amplifier and mark the important parameters.

4. What is class C operation of amplifiers? Name its main application.

5. State Barkhausen criterion.

6. Draw the circuit of a colpitts oscillator.

7. What is a bistable multivibrator? How is it different from monostable and astable types?

8. Calculate the total pulse duration and duty cycle of 555 timer astable multivibrator if $R_A = R_B = 5$ KΩ, $C = 10$ μF.

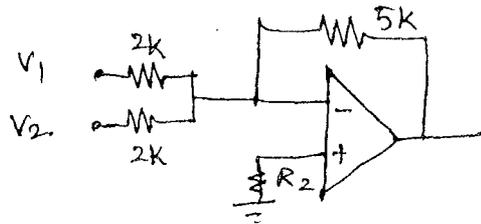9. Calculate the gain of the amplifier given in Fig. 1 if $V_1 = V_2$. If each input is 1 volt, what is the output?

Fig. 1

10. The output of an operational amplifier varies by 4 voltas in 2 μ sec . Calculate its slew rate.

PART B — (5 × 16 = 80 marks)

11. (i)   What are the merits and demerits of FET compared to BJT?   (4)

    (ii) Draw the structure of depletion type MOSFET and explain its operation. Also draw the drain characteristics and transfer characteristics and mark different regions of operation of the same.   (12)

12. (a) (i)   Explain, with a circuit diagram, the operation of class B complementary symmetry power amplifier.   (8)

        (ii) Derive the expression for the efficiency of class B power amplifier.(8)

Or

    (b) (i)   Compare the three configurations of transistor with reference to their voltage and current gains, input and output impedances and phase relation between input and output. Mention any one application of each.   (6)

(ii) Determine the dc bias voltage V_{CE} and current I_C for the voltage divider configuration shown in Fig. 2. (10)
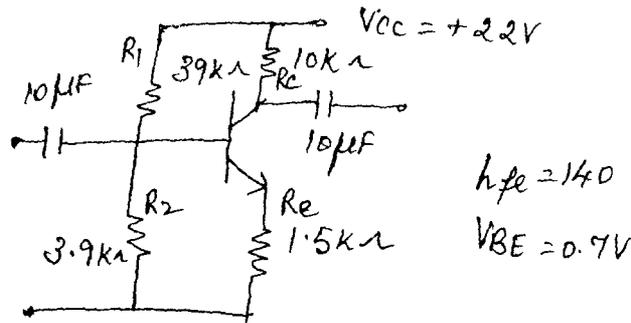

Fig. 2

13. (a) Draw the circuit of RC phase shift oscillator and explain how it works as an oscillator. Derive the expression for its frequency of oscillation.

Or

(b) With relevant diagrams, analyse the effect of negative feedback on the input and output impedances of voltage series and current shunt feedback amplifiers.

14. (a) Draw the circuit of an astable multivibrator using transistors and explain its operation. Derive the expression for the pulse duration of the output.

Or

(b) (i) Draw the internal architecture of 555 timer. (6)

(ii) Explain the operation of 555 timer as monostable multivibrator with relevant diagrams. (10)

15. (a) (i) Mention the important characteristics of ideal operational amplifier. (4)

(ii) Draw the circuit of a differentiator using operational amplifier and explain with relevant derivations, that the circuit acts as a differentiator. (6)

(iii) Explain the application of operational amplifier as a current to voltage converter. (6)

Or

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(b) (i) Design a second order Butterworth low pass filter using operational amplifier with a midband gain of 4 and a cut off frequency of 1 KHz.

(8)

(ii) With the circuit diagram, give the design steps of a second order Butterworth high pass filter using OPAMP.

(8)

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