2 0 1 6

(4th Semester)

ELECTRONICS

FOURTH PAPER

(Pulse Switching Circuits)

(PART : A—OBJECTIVE)

(*Marks* : 20)

SECTION—A

(*Marks* : 5)

Each question carries 1 mark

Answer **all** questions

Put a Tick (✓) mark against the correct answer in the brackets provided :

1. When negative voltage feedback is applied to an amplifier, its input impedance

    (a) is decreased   (   )

    (b) is increased   (   )

    (c) remains the same   (   )

    (d) is fluctuating, increased and later decreased   (   )

2. In an oscillator, the feedback to its input terminal from the output is

(a) in phase with input signal   (   )

(b) 180° out of phase with input signal   (   )

(c) 90° out of phase with input signal   (   )

(d) decreasing in magnitude   (   )

3. If Barkhausen criterion is not fulfilled by an oscillator circuit, then it will

(a) become an amplifier   (   )

(b) produce damped wave continuously   (   )

(c) stop oscillating   (   )

(d) produce high frequency whistles   (   )

4. A bistable multivibrator is a _____ oscillator.

(a) saw-tooth   (   )

(b) free-running   (   )

(c) sine-wave   (   )

(d) triggered   (   )

5. According to the algebra of logic, $(A + \overline{A})$ equals

(a) A (   )

(b) 0 (   )

(c) 1 (   )

(d) $\overline{AA}$ (   )

SECTION—B

(*Marks* : 15)

Each question carries 3 marks

Answer *any* **five** questions

1. An amplifier has a current gain of 20 and output impedance of 9 kΩ without feedback. If negative feedback of feedback fraction $\beta = 0 \cdot 01$ is applied, what is the output impedance of the amplifier?

2. Mention three advantages of negative feedback.

3. Write the essentials of feedback LC oscillator.

4. Discuss the condition for stability of oscillator.

5. For a tunnel diode, $L = 0 \cdot 01\ \mu H$, $C = 5\ pF$, $r_d = 100\ \Omega$ and $R_B = 50\ \Omega$, does the circuit oscillate?
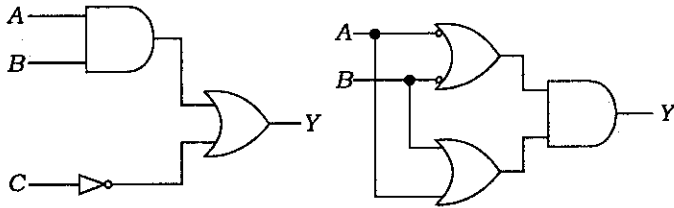
6. Write three uses of transistor bistable multivibrator.

7. Find the decimal equivalent of the 6-bit binary number 101.101.

8. With logic circuit, obtain the truth table for a NAND gate.

★★★

Or

(a) Write the Boolean equations for the following figures :

(i)   (ii)

Compute the values of the outputs if $A = 1$, $B = 1$ and $C = 1$.   2+2=4

(b) Show that $ABC + A\overline{B}C + AB\overline{C} = A(B + C)$.   3

★ ★ ★

2 0 1 6

(4th Semester)

ELECTRONICS

FOURTH PAPER

(Pulse Switching Circuits)

Full Marks : 55

Time : 2½ hours

(PART : B—DESCRIPTIVE)

(*Marks* : 35)

*The figures in the margin indicate full marks
for the questions ,*

1. (a) Why is feedback necessary in an amplifier? Explain the two types of feedback and mention their uses.   1+2+1=4

(b) Show that the gain of an amplifier is stabilized by introducing negative feedback in it.   3

Or

(a) Discuss how frequency bandwidth of an amplifier is increased by the application of negative feedback.   6

(b) What do you mean by open-loop gain and closed-loop gain?   1

2. *(a)* Distinguish between sinusoidal and non-sinusoidal oscillators.   2

(b) Explain the circuit operation of Wien bridge oscillator. Also, write its advantages and disadvantages.   3+2=5

Or

(a) What is tank circuit?   1

(b) In the phase-shift oscillator,

$$R_1 = R_2 = R_3 = 1\,M\Omega$$
$$\text{and} \quad C_1 = C_2 = C_3 = 68\,pF$$

At what frequency does the circuit oscillate?   2

(c) From crystal oscillator equivalent circuit, derive series and parallel resonant frequencies.   4

3. *(a)* Draw the circuit diagram of tuned collector oscillator.   2

(b) Derive the frequency of oscillation and conditions for sustained oscillation of Colpitts oscillator.   3+2=5

Or

(a) A tuned collector oscillator circuit used in the local oscillator of a radio receiver makes use of an LC tuned circuit with $L_1 = 58 \cdot 6\,\mu H$ and $C_1 = 300\,pF$. Calculate the frequency of oscillations.   2

(b) Explain the circuit operation of Hartley oscillator and derive its frequency of oscillations.   2+3=5

4. *(a)* With a neat sketch, explain the working principle of astable multivibrator.   5

(b) Show that the switching time (time period) of an astable multivibrator is 1·38 times the product of R and C.   2

Or

(a) Explain the working principle of monostable multivibrator with necessary diagram.   5

(b) Write the differences between multivibrator and Schmitt trigger.   2

5. *(a)* Using 1's complement method, subtract 01101_2 from 11011_2.   3

(b) With the help of a neat diagram, discuss the working and truth table of XOR gate.   4