2013

(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. The gain (A') of the amplifier with negative feedback is equal to (where $\beta A >> 1$)

(a) β ( )

(b) $\frac{1}{\beta}$ ( )

(c) $\frac{1}{A\beta}$ ( )

(d) $A\beta$ ( )

where A is open-loop gain, β is feedback ratio.

2. Wien bridge oscillator uses

(a) negative feedback ( )

(b) positive feedback ( )

(c) both negative and positive feedback ( )

(d) no feedback ( )

3. The frequency of oscillations of Colpitt's oscillator is given by

(a) $f = \dfrac{1}{2\pi\sqrt{L(C_1 + C_2)}}$ ( )

(b) $f = \dfrac{1}{2\pi L C_1 C_2}$ ( )

(c) $f = \dfrac{1}{2\pi}\sqrt{\dfrac{C_1 + C_2}{L C_1 C_2}}$ ( )

(d) $f = \dfrac{1}{2\pi}\sqrt{\dfrac{C_1 C_2}{L(C_1 + C_2)}}$ ( )

where L is inductance, C_1 and C_2 are capacitances.

4. The decimal number represented by the BCD code 10000110 is

(a) 86 ( )

(b) 45 ( )

(c) 67 ( )

(d) 91 ( )

5. The approximate time constant with which commutating capacitor C_1 is recharged in bistable multivibrator is

(a) $\tau_1 = \left(\frac{R_1 + R_2}{R_1 R_2}\right) C_1$ ( )

(b) $\tau_1 = (R_1 + R_2) C_1$ ( )

(c) $\tau_1 = \left(\frac{R_1 R_2}{R_1 + R_2}\right) C_1$ ( )

(d) $\tau_1 = R_1 R_2 (R_1 + R_2) C_1$ ( )

SECTION—B

(*Marks* : 15)

Each question carries 3 marks

Answer *any* **five** questions

1. With a logic circuit, obtain the truth table for a NOR gate.

2. Show that the negative feedback reduces the amplifier distortion by a factor $(1 + \beta A)$.

3. Show that for sustained oscillations in Wien bridge oscillator, the amplifier requires a gain exceeding 3.

4. With the help of neat circuit diagram, discuss the working of AND gate.

5. An amplifier has a gain of 2×10^5 without feedback. Determine the gain if negative feedback is applied. (Take feedback fraction $\beta = 0{\cdot}02$)

6. Write the disadvantages of phase-shift oscillators. Also write the expression for the frequency of oscillation of crystal oscillator.

7. Write the differences between multivibrator and Schmitt trigger.

8. Write the advantages of digital voltmeter over their analog counterparts.

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ELECTRONICS

FOURTH PAPER

(Pulse Switching Circuits)

Full Marks : 55

Time : 2 hours

(PART : B—DESCRIPTIVE)

(*Marks* : 35)

The figures in the margin indicate full marks for the questions

1. *(a)* What is sinusoidal oscillator? With a neat diagram, explain the action of Hartley oscillator. 1+4=5

(b) What is Barkhausen criterion? 2

Or

(a) What is feedback amplifier? Discuss the principle of negative feedback in amplifiers with a neat diagram. 1+3=4

(b) With a neat diagram, show that input impedance of a transistor amplifier increases due to negative feedback. 3

2. (a) Write the advantage of Wien bridge oscillator over *R-C* oscillators. Find the frequency of oscillations of a Wien bridge oscillator with $R = 20\ k\Omega$ and $C = 1000\ pF$. 1+2=3

(b) Discuss the operation of phase-shift oscillator with a necessary circuit diagram. 4

Or

(a) Describe crystal oscillator. 5

(b) Discuss the essentials of an oscillator. 2

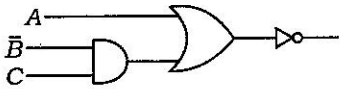
3. (a) A certain Colpitt's oscillator uses a tank circuit with $L = 20\ mH$, $C_1 = 200\ pF$ and $C_2 = 300\ pF$. What is the frequency of oscillation? 2

(b) Explain how negative feedback can increase the value of bandwidths in amplifier. 5

4. What is multivibrator? Draw the circuit diagram of astable multivibrator and explain its working principle. 1+6=7

Or

(a) What are logic gates? Write the Boolean equation for the figure given below : 1+2=3



(b) Convert 200_{10} into binary and hexadecimal. 2+2=4

5. (a) Derive an expression for the gate width of a transistor monostable multivibrator. 3

(b) What is digital odometer? Explain the working of digital speedometer. 1+3=4

Or

(a) Show that

$$(\overline{A} + \overline{B})\overline{C} + \overline{A}\overline{B} = \overline{A} + \overline{B}$$ 2

(b) Explain with neat diagram the symmetrical triggering in case of bistable transistor multivibrator. 5

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