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(Pre-CBCS)

(4th Semester)

ELECTRONICS

FOURTH PAPER

(Pulse Switching Circuits)

(Revised)

Full Marks : 55

Time : 2½ hours

(PART : A—OBJECTIVE)

(*Marks* : 20)

The figures in the margin indicate full marks for the questions

Answer **all** questions

SECTION—A

(*Marks* : 5)

Tick (✓) the correct answer in the brackets provided : 1×5=5

1. Positive feedback is used in

(a) oscillator ( )

(b) amplifier ( )

(c) rectifier ( )

(d) filter ( )

2. An oscillator converts

(a) a.c. power into d.c. power ( )

(b) d.c. power into a.c. power ( )

(c) mechanical power into a.c. power ( )

(d) sine wave to square wave ( )

3. The operating frequency of Wien bridge oscillator is given by

(a) $\dfrac{1}{2\,\sqrt{LC}}$ (   )

(b) $\dfrac{1}{4\,\sqrt{LC}}$ (   )

(c) $\dfrac{1}{2\,RC}$ (   )

(d) $\dfrac{1}{4\,RC}$ (   )

4. A bistable multivibrator circuit

(a) has two unstable states   (   )

(b) has one energy storage element   (   )

(c) switches between its two states automatically   (   )

(d) is not an oscillator   (   )

5. The binary addition 1   1   1 gives

(a) 111   (   )

(b) 10   (   )

(c) 110   (   )

(d) 11   (   )

SECTION—B

(*Marks* : 15)

Answer any *five* questions :   3×5=15

1. What do you mean by open-loop gain and closed-loop gain in a feedback amplifier?

2. Show that the application of negative feedback reduces distortion and noises in an amplifier.

3. The tuned collector oscillator circuit used in the local oscillator of a radio receiver makes use of an *LC* tuned circuit with L_1 58·6 H and C_1 300 pF. Calculate the frequency of oscillations.

4. Why is NAND gate called universal gate?

5. What are the uses of multivibrators?

6. Convert the decimal number 37 to its equivalent binary number.

7. Subtract $(01101)_2$ from $(11011)_2$ using 1's complement method.

8. Write a note on digital voltmeter.

(PART : B—DESCRIPTIVE)

(Marks : 35)

The figures in the margin indicate full marks for the questions

1. *(a)* Explain different types of negative feedback with diagrams. 4

    (b) In a negative feedback amplifier, A 100, 0·04 and V_i 50 mV. Find *(i)* gain with feedback, *(ii)* output voltage and *(iii)* feedback factor. 3

OR

    (a) What are positive and negative feedbacks? Give one application of each. 2+1=3

    (b) Explain how the gain of an amplifier is stabilised by the introduction of negative feedback in it. 4

2. *(a)* What are the essential components of an oscillator? State the Barkhausen criterion for sustained oscillations. 2+1=3

    (b) Draw the circuit diagram of Colpitts oscillator. Explain the circuit operation. 1+3=4

OR

    (a) What is sinusoidal oscillator? Discuss the advantages of sinusoidal oscillator over non-sinusoidal oscillator. 1+2=3

    (b) With suitable diagram, explain the working of Hartley oscillator. 4

3. *(a)* Explain the principle of phase-shift oscillator and discuss the circuit operation with necessary diagram. 2+3=5

(b) What are the advantages and disadvantages of Wien bridge oscillator? 2

OR

(a) Explain amplitude stability and frequency stability of an oscillator. 4

(b) What is piezoelectric effect? Explain the application of piezoelectric effect in producing resonant frequencies. 1+2=3

4. Describe the operation of astable multivibrator. Show that the switching time of astable multivibrator is 1·38 RC, where symbols have their usual meanings. 5+2=7

OR

(a) What are the basic differences among the three types of multivibrator? 3

(b) Why is Schmitt trigger called emitter-coupled binary? Write the uses of Schmitt trigger. 2+2=4

5. *(a)* Write down the procedures involved in converting a given binary integer to its equivalent decimal number. Using such procedures, convert $(11001)_2$ to its equivalent decimal number. 2+2=4

(b) What is logic gate? Write the symbol and truth table of AND gate. 3

OR

(a) Add $(110011)_2$ to $(101101)_2$ using binary addition method. 3

(b) Giving examples, define analog and digital instruments. What are the advantages of digital instruments over analog instruments? 2+2=4

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