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(4th Semester)

ELECTRONICS

FOURTH PAPER

(Pulse Switching Circuit)

(PART : A—OBJECTIVE)

(Marks : 20)

SECTION—I

(Marks : 5)

Each question carries 1 mark

Answer **all** questions

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

1. A Wien-bridge oscillator uses — feedback.

(a) only positive ()

(b) only negative ()

(c) both positive and negative ()

(d) zero ()

2. In Colpitts' oscillator, feedback is obtained

- (a) by magnetic induction ()
- (b) by a tickler coil ()
- (c) from collector of transistor ()
- (d) from the centre of split capacitor ()

3. Positive feedback is used in

- (a) amplifier ()
- (b) oscillator ()
- (c) rectifier ()
- (d) filter ()

4. If A and B represent the inputs of an exclusive OR gate, its output Y is given by

(a) $Y = A \cdot B + B \cdot A$ ()

(b) $Y = A + B + (B \cdot A)$ ()

(c) $Y = A \cdot \bar{B} + \bar{A} \cdot B$ ()

(d) $Y = \overline{AB} + B \cdot A$ ()

5. The switching time (time period) of an astable multivibrator is

(a) $1 \cdot 2RC$ sec ()

(b) $2RC$ sec ()

(c) $1 \cdot 38RC$ sec ()

(d) $1/RC$ sec ()

(4)

SECTION—II

(Marks : 15)

Each question carries 3 marks

Answer *any five* questions

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

(5)

2. Write the mathematical and graphical explanation of Barkhausen criterion for sustained oscillation.

(6)

3. With the help of a neat diagram, discuss the working of an OR gate.

4. A tuned-circuit capacitor has a fixed inductance of $100\ \mu\text{H}$ and has to be tunable over the frequency band of $500\ \text{kHz}$ to $1500\ \text{kHz}$. Find the range of variable capacitor to be used.

5. Write three advantages of negative feedback.

6. What are the advantages of digital voltmeter as compared to other voltmeters? Draw the block diagram of digital voltmeter.

(10)

7. A crystal has the parameters $L = 3.3 \text{ H}$, $C = 65 \text{ pF}$, $R = 5.5 \text{ k}\Omega$ and $C_s = 10 \text{ pF}$. Calculate the series resonant and parallel resonant frequencies of the crystal.

8. Draw the circuit diagram of Schmitt trigger and explain its working.

(b) Explain the circuit operation of Colpitts' oscillator. Also derive its frequency of oscillations. 2+3=5

5. (a) What would be the output signal if two input binary signals given by $A = 101011_2$ and $B = 110101_2$ are applied to (i) AND gate, and (ii) NAND gate? 2+2=4

(b) Multiply 1111_2 by 0111_2 using binary multiplication method. 3

Or

(a) Convert 101.11_2 into its equivalent decimal number. 2

(b) Convert 92 into its equivalent binary number. 2

(c) Show that

$$\overline{ABC} + \overline{A}BC + \overline{A}B\overline{C} + A\overline{B}C + \overline{A}BC = A + BC$$

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2015

(4th Semester)

ELECTRONICS

FOURTH PAPER

(Pulse Switching Circuit)

Full Marks : 55

Time : 2½ hours

(PART : B—DESCRIPTIVE)

(Marks : 35)

The figures in the margin indicate full marks for the questions

1. (a) Distinguish between sinusoidal and non-sinusoidal oscillator. 2
- (b) Explain the circuit operation of phase-shift oscillator. Also write its advantages and disadvantages. 3+2=5

(2)

Or

- (a) In the Wien-bridge oscillator, $R_1 = R_2 = 220 \text{ k}\Omega$ and $C_1 = C_2 = 250 \text{ pF}$. Determine the frequency of oscillations. 2
- (b) What is piezoelectric effect? From negative resistance equivalent circuit, derive resistive cut-off frequency and self-resonant frequency. 1+4=5

2. (a) With neat diagrams, explain various types of negative feedback. 3
- (b) What is feedback? Derive an expression for the gain of negative feedback amplifier. 1+3=4

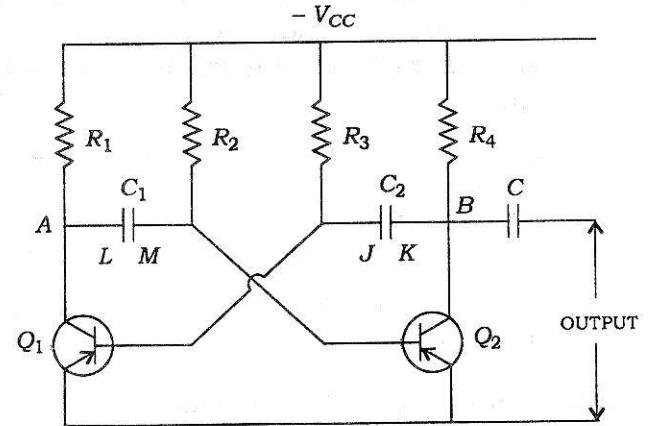
Or

- (a) With mathematical expression, show how distortion is reduced in an amplifier with the application of negative feedback. 3
- (b) How does the negative feedback bring about the change in input impedance of an amplifier? 4
3. (a) What is multivibrator? 1
- (b) Discuss with suitable circuit diagram, the circuit details and the operation of transistor bistable multivibrator. 6

(3)

Or

- (a) Write the uses of Schmitt trigger. 3
- (b) In astable multivibrator shown below, $R_2 = R_3 = 10 \text{ k}\Omega$ and $C_1 = C_2 = 0.01 \mu\text{F}$:



Determine the time period and frequency of the square wave. 2+2=4

4. (a) Write the circuit diagram of shunt-fed Hartley oscillator. 2
- (b) Derive the frequency of oscillation of tuned-collector oscillator. 5

Or

- (a) For the Colpitts' oscillator, $C_1 = 750 \text{ pF}$, $C_2 = 2500 \text{ pF}$ and $L = 40 \mu\text{H}$. Determine the operating frequency. 2