





5. An important limitation of a crystal oscillator is
  - (a) its high Q
  - (b) its low output
  - (c) less availability of quartz crystal
  - (d) its high output
  
6. In a Wien bridge oscillator, if the resistances in the positive feedback circuit are decreased, the frequency .....
  - (a) remains the same
  - (b) decreases
  - (c) increases
  - (d) insufficient data
  
7. A bistable multivibrator has .....
  - (a) two stable states
  - (b) one stable state
  - (c) no stable state
  - (d) three stable states
  
8. The frequency of oscillation of an astable multivibrator depends on the
  - (a) value of transistor  $\beta$
  - (b) value of collector load resistors
  - (c) RC values of the circuit
  - (d) width of the input pulse
  
9. The number  $1000_2$  is equivalent to decimal number
  - (a) one thousand
  - (b) eight
  - (c) four
  - (d) sixteen
  
10. In Boolean algebra, the bar sign ( $\bar{\phantom{x}}$ ) indicates.
  - (a) OR operation
  - (b) AND operation
  - (c) NOT operation
  - (d) none of the above

**(SECTION: B – SHORT NOTES)**  
**(Marks: 10)**

**Answer any four questions of the following:**

**$2\frac{1}{2} \times 4 = 10$**

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

**Or**

Why is feedback necessary in an amplifier? Draw a circuit diagram of negative feedback amplifier showing the components of feedback circuit.

2. What is oscillator? Distinguish between damped and undamped oscillator.

**Or**

For the Hartley oscillator,  $C = 250 \text{ pF}$ ,  $L_1 = 1.5 \text{ mH}$ ,  $L_2 = 1.5 \text{ mH}$  and  $M = 0.58 \text{ mH}$ . Determine the operating frequency

3. Write the circuit diagram of phase-shift oscillator. Also write its advantages and disadvantages

**Or**

Discuss the condition for stability of oscillator.

4. What is the basic difference among the three types of multivibrators?

**Or**

Write the uses of Schmitt trigger.

5. Divide  $1110011_2$  by  $101_2$  using binary division method.

**Or**

Write the symbol and truth table of NOR gate

**(SECTION: C – DESCRIPTIVE)**

*(Marks: 30)*

*The questions are of equal values*

**Answer any three from the following questions:**

**10x3=30**

1. (a) What is feedback in an amplifier? With appropriate diagrams, explain the working of positive and negative feedback amplifiers.
- (b) When negative voltage feedback is applied to an amplifier of gain 100, the overall gain falls to 50. (i) calculate the fraction of the output voltage feedback (ii) If this fraction is maintained, calculate the value of amplifier gain required if the overall stage gain is to be 75.
- (c) Why is negative feedback applied in high gain amplifiers?

**OR**

2. (a) Show that in a Negative Feedback Amplifier, the gain is stabilized.
- (b) Explain different types of negative feedback with diagrams.

3. (a) Derive the frequency of oscillation and condition for sustained oscillation of Colpitt's oscillator.
- (b) Explain the circuit operation of tuned collector and derive its frequency of oscillation

**OR**

4. (a) Explain the constructions and operations of series-fed and shunt-fed Hartley oscillators.

(b) The tuned collector oscillator circuit used in the local oscillator of a radio receiver makes use of an LC tuned circuit with  $L_1 = 58.6 \mu\text{H}$  and  $C_1 = 300 \text{ pF}$ . Calculate the frequency of oscillations.

(c) Find the operating frequency of a transistor Hartley Oscillator if  $L_1 = 50 \mu\text{H}$ ,  $L_2 = 1 \text{ Mh}$  and mutual inductance  $M = 10 \mu\text{H}$  and  $C = 10 \text{ pF}$ .

5. (a) With circuit diagram, explain the operation, advantages and disadvantages of Wien bridge oscillator.

(b) A crystal has a parameters  $L = 3.3 \text{ H}$ ,  $C = 0.65 \text{ pF}$ ,  $R = 5.5 \text{ k}\Omega$  and  $C_S = 10 \text{ pF}$ . Calculate (i) series resonant frequency (ii) parallel resonant frequency.

(c) In the phase shift oscillator,  $R_1 = R_2 = R_3 = 1\text{M}\Omega$  and  $C_1 = C_2 = C_3 = 68 \text{ pF}$ . At what frequency does the circuit oscillate?

**OR**

6. (a) What is piezo electric effect? Explain series and parallel resonant frequencies from crystal oscillator equivalent circuit.

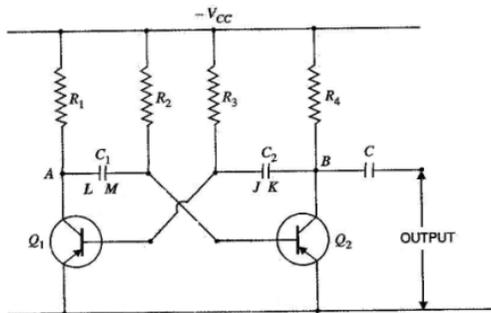
(b) In the Wien Bridge oscillator,  $R_1 = R_2 = 220 \text{ k}\Omega$  and  $C_1 = C_2 = 250 \text{ pF}$ . Determine the frequency of oscillations?

(c) For a tunnel diode,  $L=1.0\mu\text{H}$ , and  $C= 40 \text{ pF}$ . If the negative resistance region of the diode characteristics has a negative slope  $r_d = 200 \Omega$  and the bulk resistance of the device  $R_B = 25 \Omega$ , does the circuit produce oscillations?

7. (a) Explain the construction, operation of Astable multivibrator.  
 (b) Why is Schmitt Trigger called *emitter-coupled binary*? Write the uses of Schmitt Trigger.

**OR**

8. (a) With a neat sketch, explain the construction and operation of Monostable multivibrator.  
 (b) In the astable multivibrator shown below,  $R_2 = R_3 = 10 \text{ k}\Omega$  and  $C_1 = C_2 = 0.01 \text{ }\mu\text{F}$ . Determine the time period and frequency of the square wave.



9. (a) With the help of logic circuit diagram, explain the operation and truth table of XOR gate.  
 (b) Write the symbol and truth table of AND gate  
 (c) Convert the binary fraction 0.101 into its decimal equivalent

**OR**

10. (a) Write the construction and working of half subtractor.  
 (b) Using 1's complemental method, subtract  $01101_2$  from  $11011_2$ .  
 (c) With logic circuit, obtain the truth table for a NAND and NOR gate.

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