Electronic Circuits II

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1. Define positive feedback?

If the feedback signal is in phase with input signal, then the net effect of the feedback will increase the input signal given to the amplifier. This type of feedback is said to be positive or regenerative feedback.

2. Define negative feedback?

If the feedback signal is out of phase with the input signal then the input voltage applied to the basic amplifier is decreased and correspondingly the output is decreased. This type of feedback is known as negative or degenerative feedback.

3. Define sensitivity?

Sensitivity is defined as the ratio of percentage change in voltage gain with feedback to the percentage change in voltage gain without feedback.

4. What are the types of feedback?

i. Voltage-series feedback
ii. Voltage-shunt feedback
iii. Current-series feedback
iv. Current-shunt feedback

5. Define feedback?

A portion of the output signal is taken from the output of the amplifier and is combined with the normal input signal. This is known as feedback.

6. Write the expression for input and output resistance of voltage series feedback amplifier.

Input resistance with feedback, $R_{if} = (1+A\beta)\, R_i$

Output resistance with feedback, $R_{of} = R_o / (1+A\beta)$

7. Give an example for voltage-series feedback.

The Common collector or Emitter follower amplifier is an example for voltage series feedback.

8. Write the expression for input and output resistance of current shunt feedback amplifier.

Input resistance with feedback, $R_{if} = R_i / (1+A\beta)$

Output resistance with feedback, $R_{of} = R_o (1+A\beta)$

9. Give the properties of negative feedback.

i. Negative feedback reduces the gain
ii. Distortion is very much reduced

10. Give the effect of negative feedback on amplifier characteristics.

Characteristics	Type of feedback			
	Current-series	Voltage-series	Voltage-shunt	Current-shunt
Voltage gain	Decreases	Decreases	Decreases	Decreases
Bandwidth	Increases	Increases	Increases	Increases
Input resistance	Increases	Increases	Decreases	Decreases
Output resistance	Increases	Decreases	Decreases	Increases

11. What is Oscillator circuit?

A circuit with an active device is used to produce an alternating current is called an oscillator circuit.

12. What are the classifications of Oscillators?

*<u>Based on wave generated:</u>

i. Sinusoidal Oscillator,
ii. Non-sinusoidal Oscillator or Relaxation Oscillator
Ex: Square wave, Triangular wave, Rectangular wave etc.

*<u>According to principle involved:</u>

i. Negative resistance Oscillator,
ii. Feedback Oscillator.

*<u>According to frequency generated</u>:

i. Audio frequency oscillator
20 Hz – 20 kHz
ii. Radio frequency Oscillator
30 kHz – 30 MHz
iii. Ultrahigh frequency Oscillator
30 MHz – 3 GHz
iv. Microwave Oscillator
3 GHz – above.

* Crystal Oscillators.

13. Define Barhausen Criterion.

The product βA_v is greater than one this is called Barhausen criterion.

$A_{vf} = A_v/1-\beta A_v$

$A_{vf} = \infty = {}^1/_0$

$=>1-\beta A_v < 0$

$=> \beta A_v > 1$ this is the condition for feedback Oscillator.

An Oscillator which follows Barkhausen criterion is called the Feedback Oscillator.

14. What are the types of feedback oscillators?

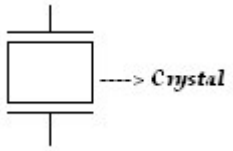
* RC-Phase shift Oscillator,
* LC-Oscillators
    i. Tuned collector Oscillator
    ii. Tuned emitter Oscillator
    iii. Tuned collector base Oscillator
    iv. Hartley Oscillator
    v. Colpits Oscillator
    vi. Clap Oscillator

15. What are the conditions for oscillation?

The total phase shift of an oscillator should be $360^{o.}$ For feedback oscillator it should satisfies Barhausen criterion.

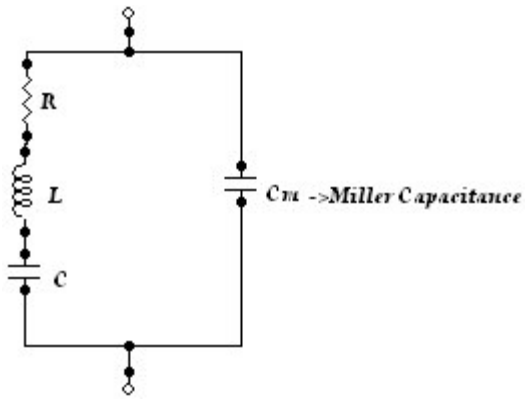
16. Define Piezoelectric effect.

When applying mechanical energy to some type of crystals called piezoelectric crystals the mechanical energy is converted into electrical energy is called piezoelectric effect.



$F \alpha {}^1/_T$

17. Draw the equivalent circuit of crystal oscillator.



18. What is Miller crystal oscillator? Explain its operation.

It is nothing but a Hartley oscillator its feedback Network is replaced by a crystal.

Crystal normally generate higher frequency reactance due to the miller capacitance are in effect between the transistor terminal.

19. State the frequency for RC phase shift oscillator.

The frequency of oscillation of RC-phase shift oscillator is

$$F=\frac{1}{2\Pi RC\sqrt{(4k+6)}}$$

Where k=2.639.

20. Define Oscillator

A circuit with an active device is used to produce an alternating current is called an oscillator circuit.

21. What is a tuned amplifier?

The amplifier with a circuit that is capable of amplifying a signal over a narrow band of frequencies

Are called tuned amplifiers.

22. What is the expression for resonant frequency?

$fr=1/2\prod\sqrt{LC}$

23. What happens to the circuit above and below resonance?

Above resonance the circuit acts as capacitive and below resonance the circuit acts as inductive.

24. What are the different coil losses?

Hysteresis loss

Copper loss

Eddy current loss

25. What is Q factor?

It is the ratio of reactance to resistance.

26. What is dissipation factor?
It is referred as the total loss within a component i.e1/Q

27. What is the classification of tuned amplifiers?
Single tuned
Double tuned
Stagger tuned

28. What is a single tuned amplifier?
An n amplifier circuit that uses a single parallel tuned circuit as a load is called single tuned amplifier.

29. What are the advantages of tuned amplifiers?
They amplify defined frequencies.
Signal to noise ratio at output is good
They are suited for radio transmitters and receivers

30. What are the disadvantages of tuned amplifiers?
The circuit is bulky and costly
The design is complex.
They are not suited to amplify audio frequencies.

31. What is neutralization?
The effect of collector to base capacitance of the transistor is neutralized by introducing a signal that cancels the signal coupled through collector base capacitance. This process is called neutralization.

32. What are double tuned amplifiers?
The amplifiers having two parallel resonant circuit in its load are called double tuned amplifiers.

33. What is a stagger tuned amplifier?
It is a circuit in which two single tuned cascaded amplifiers having certain bandwidth are taken and their resonant frequencies are adjusted that they are separated by an amount equal to the bandwidth of each stage. Since resonant frequencies are displaced it is called stagger tuned amplifier.

34. What are the advantages of stagger tuned amplifier?
The advantage of stagger tuned amplifier is to have better flat, wideband characteristics.

35. What are the advantages of double tuned over single tuned?
1. Possess flatter response having steeper sides
2. Provides larger 3 db bandwidth
3. Provides large gain-bandwidth product.

36. What are the different types of neutralization?
1. Hazeltine neutralization
2. Rice neutralization
3. Neutrodyne neutralization.

37. What is rice neutralization?
It uses center tapped coil in the base circuit. The signal voltages at the end of tuned base coil are equal and out of phase.

38. What is unloaded Q?
It is the ratio of stored energy to the dissipated energy in a reactor or resonator.

39. What are the applications of mixer circuits?
Used in radio receivers. Used to translate signal frequency to some lower frequency

40. What is up converter?
When the mixer circuit is used to translate signal to high frequency, then it is called up converter.

41 What is an amplifier?
An amplifier is a device which produces a large electrical output of similar characteristics to that of the input parameters.

42. How are amplifiers classified according to the input?
1. Small – signal amplifier 2. Large – signal amplifier

43. How are amplifiers classified according to the transistor configuration?
1. Common emitter amplifier 2. Common base amplifier 3. Common collector amplifier

44. What is the different analysis available to analyze a transistor?
1. AC analysis 2. DC analysis

45. How can a DC equivalent circuit of an amplifier be obtained?
By open circuiting the capacitor.

46. How can a AC equivalent circuit of a amplifier be obtained?
By replacing dc supply by a ground and short- circuiting capacitors.

47. What is feed back?
It is the process of injecting some energy from the output and then returns it back to the input.

48. What is the disadvantage of negative feed back?
Reduces amplifier gain.

49. Define sensitivity.
It is the ratio of percentage change in voltage gain with feedback to the percentage change in voltage gain without feed back.

50. Define Desensitivity.
It is the ratio of percentage change in voltage gain without feedback to the percentage change in voltage gain with feed back. the reciprocal of sensitivity.

51, What is a Multivibrator?

The electronic circuits which are used to generate nonsinusoidal waveforms are called Multivibrators.

52, Name the types of Multivibrators?

Bistable Multivibrator, Monostable Multivibrator,Astable Multivibrator

53, How many stable states do bistable Multivibrator have?

Two stable states.

54, When will the circuit change from stable state in bistable Multivibrator ?

when an external trigger pulse is applied, the circuit changes from one stable state to another.

55, What are the different names of bistable Multivibrator?

Eccles Jordan circuit, trigger circuit, scale-of-2 toggle circuit, flip-flop and binary.

56, What are the applications of bistable Multivibrator?

It is used in the performance of many digital operations such as counting and storing of the
Binary information. It also finds applications in the generation and processing of pulse – type waveforms.

57, What are the other names of monostable Multivibrator?

One-shot, Single-shot, a single-cycle, a single swing, a single step Multivibrator, Univibrator.

58, Why is monostable Multivibrator called gatting circuit?

The circuit is used to generate the rectangular waveform and hence can be used to gate other
Circuits hence called gating circuit.

59, Why is monostable Multivibrator called delay circuit?

The time between the transition from quasi-stable state to stable state can be predetermined and
hence it can be used to introduce time delays with the help of fast transition. Due to this application is Called delay circuit.

60, What is the main characteristics of Astable Multivibrator

The Astable Multivibrator automatically makes the successive transitions from one quasi- stable
State to other without any external triggering pulse.

61, What is the other name of Astable Multivibrator- why is it called so?

As it does not require any external pulse for transition, it is called free running Multivibrator.

62, What are the two types of transister bistable Multivibrator?

i. Fixed bias transistor circuit
ii. Self bias transistor circuit.

63, Why does one of the transistor start conducting ahead of other?

The characteristic of both the transistors are never identical hence after giving supply one of the
Transistors start conducting ahead of the other.

64, What are the two stable states of bistable Multivibrator?

i. Q1 OFF (cut off) and Q2 ON (Saturation)
ii. Q2 OFF (Cut off) and Q1 On (Saturation)

65, What finally decides the shape of the waveform for bistable multivibrator?

The spacing of the triggering pulses

66, How are the values R1, R2 and VBB chosen in bistable Multivibrator?

It is chosen in such a way that in one state the base current is large enough to drive the transistor into saturation while in other state the emitter junctions is well below off.

67, What is the self biased Multivibrator?

The need for the negative power supply in fixed bias bistable Multivibrator can be eliminated by rising a common emitter resistance R_E. The resistance previous the necessary bias to keep one transistor or and the other OFF in the stable state such type of biasing is called self biasing and the circuit is called self biased bistable Multivibrator.

68, What are the other names of speed up capacitors.

i. Commutating Capacitors
ii. Transpose capacitors

69 Define transition time?

It is defined as the time interval during which conduction transfers from one transistor to other.

70, What is the value of commutating capacitor.

It lies in the range of tens to some hundreds of Pico farads.

71. Define resolving time.

The smallest allowable interval between triggers is called resolving time.

72, Give the expression of fmax with respect to resolving time

Fmax = 1/resolving time.

73, Define gate width

The pulse width is the time for which the circuit remains in the quasi stable state. It is also called gate width.

74, What are the advantages of monostable Multivibrator.

- used to introduce time delays as gate width is adjustable
- used to produce rectangular waveform and hence can be used as gating circuit.

75, What are the applications of astable Multivibtrator.

- used as a clock for binary login signals
- used as a square wave generator, voltage to frequency converter.

76, What is a complementary Multivibrator

It is turning half the circuit upside down. So one transistor is n-p-n while the other is p-n-p.

The circuit is called complementary Multivibrator circuit.

77, What is UTP of the Schmitt trigger

When Vi reaches to VBE1 +VE the Q1 gets driven to active region. This input voltage level is
called upper threshold point.

78, What is the other name for UTP

It is also called input turn on threshold level.

79, What is LTP Schmitt trigger.

The level of Vi at which Q1 becomes OFF and Q2 on is called lower threshold point.

80, Define transfer Characteristics

The graph of output voltage against input voltage is called transfer characteristics of Schmitt trigger.

81, What is the important application of Schmitt trigger?

- It is used as an amplitude comparator
- It is used as a squaring circuit.

82, Define Blocking Oscillator?

A special type of wave generator which is used to produce a single narrow pulse or train of pulses.

83, What are the two important elements of Blocking Oscillator?

Transistor and pulse transformer

84, What are the applications of blocking Oscillator?

It is used in frequency dividers, counter circuits and for switching the other circuits.

86, Give the expression for co-efficient of coupling

$K=M/\sqrt{LpLs}$

M-> Mututal Inductance
Lp -> Primary Inductance
Ls -> Secondary Inductance

87, Give the formula for transformation ratio

$n= Ns/Np$ = transformation ratio

Ns= Secondary Turns;
Np= Primary turns

88, Define rise time

It is defined by the time required by the pulse to rise from 10% of its amplitude to 90% of its amplitude.

89, Define overshoot.

It is the amount by which the output exceeds its amplitude during first attempt.

90, Define flat top response.

The position of the response between the trailing edge and the leading edge.

91, Define droop or a tilt

The displacement of the pulse amplitude during its flat response is called droop or a tilt.

92, What are the applications of pulse transformer.

i. to invert the polarity of the pulse
ii. to differentiate pulse

93, When do the core saturates?

When L->o as B-> Bm, the core saturates

94, What is the other name of astable Blocking Oscillator

Free running blocking Oscillator

95, What are the two types of astable Blocking Oscillator?

1, Diode controlled Astable Blocking Oscillator.

2, Re controlled Astable Blocking Oscillator.

96, Define Sweeptime in sawtooth generator

The period during which voltage increases linearly is called sweep time.

97, What is the other name of sawtooth generator?

Ramp generator

98, Define Displacement error in the sawtooth generator?

It is defined as the maximum differenece between the actual sweep voltage and linear sweep
which passes through the beginning and end points of the actual sweep.

99, What is constant current charging?

A capacitor is charged with a constant current source.

100, What is the miller circuit

Integrator is used to convert a step waveform into ramp waveform.

PART B

1, Explain bistable Multivibrator and its types?

General form of bistable Multivibrator circuit.

- fixed Bias transistor bistable Multivibrator circuit
- self Bias transistor biastable Multivibrator circuit
- Applications

2, Explain about speedup capacitors or commutating capacitors

- Practical self biased bistable Multivibrator
- Explanation about the circuit

3, Explain about Monostable Multivibrator

- Explanation about the circuit diagram
- Pulse width of collector coupled Monostable Multivibrator
- Wareforms
- Applications

4, Explain about collector coupled astable Multivibrator

- Explanation about the circuit diagram
- Wareforms
- Distration & its eliminator
- Applications

5, Explain emitter coupled astable Multivibrator

- Operation and Mathematical analysis
- Practical circuit
- Advantages and disadvantages of the Multivibrator

6, Write in detail about Schmitt Trigger circuit?

- Circuit diagram
- Operation of the circuit
- Schmitt trigger wareforms.
- Hysterisis
- Applications

7, Explain about pulse transformer?

- Ideal pulse transformer model
- Practical equivalent circuit
- Pulse response characteristics
- Applications of pulse transformer

8, Explain Monostable blocking oscillator using emitter timing?

- Circuit Diagram
- Mathematical analysis
- Expression for pulse width
- Triggering circuit for monostable blocking oscillator

9, Write about the core saturation method

- Circuit diagram
- Waveforms of ic and iB when core Saturates.

10, Write about astable blocking oscillator.

- Diode controlled astable blocking Oscillator
- RC controlled astable blocking Oscillator

11, Write about UJT sawtooth generator

- Operation

- Circuit diagram

12, What will happen when a step input voltage is applied to the high pass RC Circuit?

- Derivation
- The output Waveform

13 .Explain the relevant information ,how the negative feed back improves stability reduce noise and increase input impedance?

Draw the circuit diagram.
Explain detail the following
- transfer gain.
- stability of gain.

The transfer of gain of the amplifier is not constant as it is depends upon the factors such as operating point temperature ,etc. This lack of stability can be reduced by introducing negative feed back.

The signal feed back reduces the amount of the noise signal and non linear distortion. The factor $(1+\beta A)$reduces both input noise and resulting non linear distortion for considerable improvement. Thus ,noise and non linear distortion also reduced by same factor.

14.Explain voltage shunt feed back amplifiers?

- Draw the circuit diagram.
- Draw the equivalent circuit .
- Find the input and output impedance after feed back.

15.Explain current series feed back amplifiers?

- Draw the circuit diagram.
- Draw the equivalent circuit .
- Find the input and output impedance after feed back.

16.Explain the classification of amplifiers?

Explain the following in detail.
- Voltage amplifier.
- Current amplifier.
- Trans conductance amplifier.
- Trans resistance amplifier.

17.Explain current shunt and voltage shunt feed back amplifiers?

- Draw the circuit diagram.

- Draw the equivalent circuit .
- Find the input and output impedance after feed back.

18. With simple diagrams explain the operation of negative resistance oscillator using tunnel diode?.

    - Draw the circuit diagram and graph.
    - Draw the characteristics of tunnel diode.
    - Get the expression for time period 't'.
    - Draw the wave form for negative resistance oscillator.

19. Explain RC phase shift oscillator?.

    - Draw the circuit diagram
    - Draw the equivalent circuit.
    - Derive the minimum value of h_{fe} for oscillation.

20. Explain Clapp's oscillator and derive the expression for frequency of oscillation . Also explain how frequency stability can be improved Clapp's oscillator.?

    - Draw the circuit diagram
    - Draw the equivalent circuit.
    - Derive the frequency of oscillation.

21. Explain Hartly oscillator and derive the equation for oscillation ?

    - Draw the circuit diagram
    - Draw the equivalent circuit.
    - Derive the frequency of oscillation.

22. Explain pierce crystal oscillator and derive the equation for oscillation?

    - Draw the circuit diagram
    - Draw the equivalent circuit.
    - Derive the frequency of oscillation.

23. Explain in detail about single tuned amplifier

    - Draw the circuit diagram

- Draw the equivalent circuit.
- Derive the expression for band width

24. Explain in detail about double tuned amplifier

- Draw the circuit diagram
- Draw the equivalent circuit.
- Derive the expression for band width

25. Explain in detail about stagger-tuned amplifier

- Draw the circuit diagram
- Draw the equivalent circuit.
- Derive the expression for band width

26. Compare single tuned and double tuned amplifier

- Compare the circuit diagram
- Compare the equivalent circuit.
- Compare the expression for band width

27. Explain the different types of neutralization?

- Explain Hazeltine neutralization
- Explain Rice neutralization.
- Explain Neutrodyne neutralization