"ज्ञान, विज्ञानआणिसुसंस्कारयासाठीशिक्षणप्रसार"

शिक्षणमहर्षी-डॉ .साळुंखेबापूजी

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QUESTION BANK

B. Sc. – III, PHYSICS (Paper-XII), DSE-E4 Digital and Analog Circuits and Instrumentation

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Multiple choice questions.

1. Which of the following is a universal gate?

   a) AND

   b) OR

   c) NAND

   d) XOR

   Answer: c) NAND

2. Which logic gate provides an output of 1 only when the inputs are different?

   a) AND

   b) NOR

   c) XOR

   d) NAND

   Answer: c) XOR

3. What is the Boolean expression for a NOR gate?

   a) A + B

   b) (A + B)'

   c) A • B

   d) (A • B)'

   Answer: b) (A + B)'

4. Which of the following represents De Morgan’s theorem?

   a) (A + B)' = A' + B'

   b) (A • B)' = A' + B'

   c) (A + B)' = A' • B'

   d) A' + B' = A • B

   Answer: c) (A + B)' = A' • B'

5. What is the function of a flip-flop?

   a) Amplification

   b) Counting

   c) Storage

   d) Both b and c

   Answer: d) Both b and c

6. Which flip-flop is known as a "universal flip-flop"?

   a) R-S

   b) D

   c) J-K

   d) T

   Answer: c) J-K

7. Which flip-flop has an undefined state when both inputs are 1?

   a) R-S

   b) J-K

   c) D

   d) T

   Answer: a) R-S

8. How many inputs does a full adder have?

   a) 2

   b) 3

   c) 4

   d) 5

   Answer: b) 3

9. The sum output of a half adder is given by which logic function?
   a) AND
   b) OR
   c) XOR
   d) NAND
   Answer: c) XOR

10. A 4-bit parallel adder consists of how many full adders?
    a) 1
    b) 2
    c) 3
    d) 4
    Answer: d) 4

11. In a CE amplifier, the output is
    a) In phase with the input
    b) 180° out of phase with the input
    c) Always zero
    d) Doubled in magnitude
    Answer: b) 180° out of phase with the input

12. The AC load line represents
    a) DC operating point
    b) Variation in voltage and current with signal
    c) Amplifier efficiency
    d) Amplifier gain
    Answer: b) Variation in voltage and current with signal

13. What is the significance of the Q point in an amplifier?
    a) Determines the stability of the amplifier
    b) Reduces distortion
    c) Sets the biasing conditions
    d) All of the above
    Answer: d) All of the above

14. Which feedback provides sustained oscillations in an oscillator?
    a) Negative feedback
    b) Positive feedback
    c) No feedback
    d) Both positive and negative feedback
    Answer: b) Positive feedback

15. What is the main requirement for an oscillator to start oscillating?
    a) Barkhausen criterion
    b) High gain
    c) Low distortion
    d) High efficiency
    Answer: a) Barkhausen criterion

16. Which oscillator uses an inductor-capacitor (LC) tank circuit?
    a) Phase shift
    b) Wien bridge
    c) Colpitts
    d) Schmitt trigger
    Answer: c) Colpitts

17. Which oscillator is most stable in frequency?
    a) Colpitts
    b) Hartley
    c) Phase shift
    d) Crystal
    Answer: d) Crystal

18. Which oscillator uses a tapped inductor?
    a) Colpitts
    b) Hartley
    c) Phase shift
    d) Crystal
    Answer: b) Hartley

19. Which part of a CRO generates an electron beam?
    a) Deflection plates
    b) Cathode
    c) Grid
    d) Anode
    Answer: b) Cathode

20. The primary function of a CRO is to display
    a) Sound waves
    b) Voltage signals
    c) Mechanical motion
    d) Temperature variations
    Answer: b) Voltage signals

21. Lissajous figures on a CRO screen are used to measure
    a) Resistance
    b) Frequency and phase difference
    c) Voltage
    d) Current
    Answer: b) Frequency and phase difference

22. An operational amplifier has
    a) One input, one output
    b) Two inputs, one output
    c) One input, two outputs
    d) Two inputs, two outputs
    Answer: b) Two inputs, one output

23. The input impedance of an ideal Op-Amp is
    a) 0
    b) Low
    c) High
    d) Infinite
    Answer: d) Infinite

24. What is the voltage gain of a unity gain buffer amplifier?
    a) 0
    b) 1
    c) 10
    d) 100
    Answer: b) 1

25. Which Op-Amp circuit performs mathematical differentiation?
    a) Differentiator
    b) Integrator
    c) Adder
    d) Subtractor
    Answer: a) Differentiator

26. Which pin of IC 555 is the trigger input?
    a) Pin 1
    b) Pin 2
    c) Pin 3
    d) Pin 4
    Answer: b) Pin 2

27. What is the duty cycle of a 555 timer in astable mode?
    a) 25%
    b) 50%
    c) 75%
    d) Variable
    Answer: d) Variable

28. A monostable multivibrator using a 555 timer has
    a) One stable state
    b) Two stable states
    c) No stable state
    d) Multiple stable states
    Answer: a) One stable state

29. A NOR gate can be used to create which of the following?
    a) AND gate
    b) OR gate
    c) NOT gate
    d) All of the above
    Answer: d) All of the above

30. What is the output of a NAND gate when both inputs are HIGH?
    a) HIGH
    b) LOW
    c) Undefined
    d) Cannot be determined
    Answer: b) LOW

31. The XOR gate is also known as
    a) Difference gate
    b) Parity gate
    c) Equality gate
    d) Inversion gate
    Answer: b) Parity gate

32. The main disadvantage of an R-S flip-flop is
    a) It is slow
    b) It has a race condition
    c) It requires many components
    d) It is expensive
    Answer: b) It has a race condition

33. Which circuit converts binary addition directly to decimal output?
    a) Half adder
    b) Full adder
    c) BCD adder
    d) XOR adder
    Answer: c) BCD adder

34. Which component stabilizes the Q-point in a transistor amplifier?
    a) Resistor
    b) Capacitor
    c) Inductor
    d) Transformer
    Answer: a) Resistor

35. The voltage gain of a transistor amplifier is given by
    a) Collector resistance/Base resistance
    b) Collector resistance/Emitter resistance
    c) Base resistance/Collector resistance
    d) Emitter resistance/Base resistance
    Answer: b) Collector resistance/Emitter resistance

36. Which of the following amplifiers has the highest voltage gain?
    a) Common Base
    b) Common Collector
    c) Common Emitter
    d) Emitter Follower
    Answer: c) Common Emitter

37. In a transistor amplifier, which load line determines the output signal swing?
    a) DC load line
    b) AC load line
    c) Both a and b
    d) None of the above
    Answer: b) AC load line

38. A transistor amplifier introduces a phase shift of
    a) 0°
    b) 90°
    c) 180°
    d) 270°
    Answer: c) 180°

39. Which type of oscillator is commonly used in RF applications?
    a) Wien Bridge
    b) Phase Shift
    c) Crystal
    d) Colpitts
    Answer: c) Crystal

40. Which oscillator circuit uses a capacitor divider network for feedback?
    a) Hartley
    b) Colpitts
    c) Phase shift
    d) Wien bridge
    Answer: b) Colpitts

41. What is the main function of a tank circuit in an oscillator?
    a) Amplification
    b) Signal modulation
    c) Energy storage and oscillation
    d) Waveform shaping
    Answer: c) Energy storage and oscillation

42. Which feedback condition is required for an oscillator?
    a) Negative feedback with gain <1
    b) Positive feedback with gain = 1
    c) Negative feedback with gain >1
    d) Positive feedback with gain >1
    Answer: b) Positive feedback with gain = 1

43. Which of the following is NOT a part of a CRT?
    a) Electron gun
    b) Deflection system
    c) Time base generator
    d) Diode bridge
    Answer: d) Diode bridge

44. Which electrode in a CRT controls the brightness of the display?
    a) Cathode
    b) Control grid
    c) Deflection plates
    d) Anode
    Answer: b) Control grid

45. The deflection sensitivity of a CRO depends on
    a) Plate voltage
    b) Screen size
    c) Deflection plate spacing
    d) All of the above
    Answer: d) All of the above

46. Lissajous figures help in determining
    a) Voltage
    b) Phase difference
    c) Resistance
    d) Power
    Answer: b) Phase difference

47. In a differential amplifier, the output depends on
    a) Sum of input voltages
    b) Difference of input voltages
    c) Product of input voltages
    d) None of the above
    Answer: b) Difference of input voltages

48. The gain of an inverting Op-Amp is given by
    a) -Rf/Rin
    b) Rin/Rf
    c) 1 + (Rf/Rin)
    d) 1 - (Rf/Rin)
    Answer: a) -Rf/Rin

49. In a 555 timer, the capacitor connected to pin 5 is used for

    a) Resetting the timer

    b) Controlling voltage levels

    c) Increasing frequency

    d) Decreasing frequency

    Answer: b) Controlling voltage levels

50. A 555 timer in astable mode generates

    a) A single pulse

    b) A continuous square wave

    c) A triangular wave

    d) A sine wave

    Answer: b) A continuous square wave