

SHIVAJI UNIVERSITY, KOLHAPUR

B.Sc. Part-III Physics CBCS (Semester-V)

PHYSICS Paper-XII

DSE-E4 Digital and Analogue Circuits and Instrumentation

Unit –I 1.Digital Electronics

**Q.1. Multiple choice questions for 1 mark**

1. -----is a logic circuit with one or more input signals, but only one output signal.  
(A) Counter                      (B) Flip Flop  
(C) counter                      **(D) gate**
2. For ----- gate, output is high when any of the input is high.  
**(A) AND**                      (B) OR  
(C) NOR                      (D) NOT
3. ----- gate is called as inverter.  
(A) OR                      (B) AND  
**(C) NOT**                      (D) NOR
4. Derived gates are -----  
(A) OR, AND, NOT                      **(B) NOR, NAND, Ex-OR**  
(C) OR, NAND, NOT                      (D) NOR, AND, NOT
5. Basic or fundamental gates are -----.  
**(A) OR, AND, NOT**                      (B) NOR, NAND, Ex-OR  
(C) OR, NAND, NOT                      (D) NOR, AND, NOT
6. NAND gate is also called as ----- gate.  
(A) unique                      (B) logic  
**(C) universal**                      (D) two input
5. The HIGH state in digital logic represents -----  
**(A) +5 volt**                      (B) +12 volt  
(C) -5 volt                      (D) 0 volt
8. A binary 1 represent a ----- level and a binary 0 represent -----level.  
(A) low, high                      **(B) high, low**  
(C) high, high                      (D) Low, low
9. The input and output states of a gate are listed in a table called -----  
(A) data table                      **(B) truth table**  
(C) input-output data                      (D) input-output condition
10. For ----- gate, output is high when both the inputs are high.  
(A) OR                      **(B) AND**  
(C) NAND                      (D) NOR
11. For Ex-OR gate when both the inputs are same output is -----.  
(A) **LOW**                      (B) HIGH

- (C) -5 VOLT (D) -1
12. The boolean equation for OR gate is -----  
 (A)  $Y=A*B$  (B)  $Y=A-B$   
 (C)  $Y=A.B$  (D)  **$Y=A+B$**
13. Example of two input quad NAND gate is-----  
 (A) **IC 7400** (B) IC 7408  
 (C) IC 7402 (D) IC 7486
14. IC 74XX series represents ----- family .  
 (A) **TTL** (B) RTL  
 (C) DTL (D) CMOS
- 15.----- is a two state circuit that can remain in either state indefinitely.  
 (A) **Flip-flop** (B) Gate  
 (C) Counter (D) Half adder
16. RS flip-flop is designed using ----- gate.  
 (A) AND (B) **NAND**  
 (C) NOT (D) OR
17. ----- flip-flop is very versatile and is most widely used type of flip-flop.  
 (A) RS (B) **JK**  
 (C) D- type (D) clocked RS
18. Toggling more than once during a positive clock edge is called ----  
 (A) **race condition** (B) steady state  
 (C) unstable state (D) switching state
19. Memory blocks are designed using -----  
 (A) logic gates (B) counter  
 (C) **flip-flops** (D) half adders
20. ----- wave form is used as clock signal in flip flops.  
 (A) **square** (B) sine  
 (C) triangular (D) saw tooth
21. In RS flip flop when S=1 and R=0 then flip flop is in ---- condition.  
 (A) **set** (B) reset  
 (C) race (D) toggle
22. Example of two input XOR gate is-----  
 (A) IC 7400 (B) IC 7408  
 (C) IC 7402 (D) **IC7486**

### Q.2 Long answer questions for 8 Marks

- Give logic symbol and truth table of OR, AND, NAND and NOR gates.
- Give logic symbol and truth table of NOR, NAND, XOR and XNOR gates.
- Why NOR gate is called universal gate? Explain with neat diagram.

### Q.3 Short answer questions for 4 marks

- i. State and prove De Morgan's theorems.
- ii. Explain R-S flip-flop using NAND/NOR gates.
- iii. Explain construction and working of J-K flip-flop.
- iv. Explain half adder circuit.
- v. Explain full adder circuit.
- vi. Explain 4 bit parallel adder circuit.

## Unit I : 2. Amplifier

### Q.1. Multiple choice questions for 1 mark

1. To draw d.c. equivalent circuit, reduce all----- to zero.  
 (A) ac sources (B) d.c. sources  
 (C) current sources (D) voltage source
1. ----- circuit increases the amplitude of weak input signal given to it.  
 (A) amplifier (B) oscillator  
 (C) rectifier (D) transmitter
2. ----- equivalent circuit, all capacitors are shorted.  
 (A) voltage (B) d.c.  
 (C) current (D) a.c.
3. The relation between  $V_{ce}$  and  $I_c$  represented by a straight line on output characteristic curve is known as a -----  
 (A) frequency response (B) frequency curve  
 (C) load-line (D) amplifier line
4. The voltage gain of an amplifier is expressed in -----  
 (A) Volts (B) ampere  
 (C) decibel(dB) (D) bell
5. The purpose of d.c. conditions in a transistor is to -----  
 (A) Reverse bias the emitter (B) Forward bias the collector  
 (C) Set up operating point (D) start its working
6. A CE amplifier is also called -----circuit.  
 (A) grounded emitter (B) grounded bias  
 (C) grounded collector (D) open collector
7. ----- equivalent circuit all capacitors are open circuited.  
 (A) a.c. (B) d.c.  
 (C) voltage (D) current
8. The phase difference between output and input signal in CE amplifier is ----- degree.  
 (A) 0 (B) 60  
 (C) 90 (D) 180
9. ----- source produces fluctuations in the transistor current and voltage .  
 (A) voltage source (B) d.c. source

- (C) current source      **(D) a.c. source**
10. ----- on the output characteristics of a transistor circuit gives the values of  $I_c$  and  $V_{ce}$  corresponding to zero signal.  
 (A) Straight line      (B) a.c. load line  
**(C) d.c. load line**      (D) both (b) & (c)
11. In single stage CE amplifier ----- transistor is used.  
 (A) four      (B) three  
 (C) two      **(D) one**
12. The point of intersection of d.c. and a.c. load line is called -----  
 (A) Intersection point      **(B) Quiescent operating point**  
 (C) dc point      (D) a.c. point
13. The curve between voltage gain and signal frequency of an amplifier is known as — curve.  
 (A) band width      **(B) frequency response**  
 (C) gain response      (D) output
14. In a transistor  
**(a)  $I_e = I_c + I_b$**       (b)  $I_e = I_c - I_b$       (c)  $I_c = I_e + I_b$       (d)  $I_b = I_c + I_e$
15. The most commonly used transistor arrangement is -----  
**(a) Common emitter**      (b) Common base  
 (c) Common collector      (d) common source

### Q.2 Long answer questions for 8 Marks

- Explain d.c. and a.c. equivalent circuit for CE amplifier.
- Explain the frequency response curve of an amplifier. What is the effect of negative feedback on gain response curve.

### Q.3 Short answer questions for 4 marks

- Explain the operation of a common emitter transistor amplifier with neat diagram.
- Explain how will you draw d.c. load line on the output characteristics of a transistor?

## 3. Oscillator

### Q.1. Multiple choice questions for 1 mark

- is an electronic circuit which converts d.c. energy into a.c. energy.  
 (A) Amplifier      **(B) Oscillator**  
 (C) Op-amp      (D) Flip-Flop
- A circuit which produces electrical oscillations of any desired frequency is known as -----  
**(A) Oscillatory circuit**      (B) Amplifier circuit  
 (C) frequency generator      (D) Inverter
- Tank circuit produces ----- oscillations.  
 (A) undamped      **(B) damped**  
 (C) sinusoidal      (D) any shape

4. For Barkhausen criteria for sustained oscillation  $A\beta$  value must be -----

- (A) 0 (b) 2  
(C) less than 1 (D) **1**

5. In phase-shift oscillator, the phase shift in each RC network is -----

- (A)  $90^\circ$  (B)  $120^\circ$   
(C)  **$60^\circ$**  (D)  $45^\circ$

6. In phase-shift oscillator, the feedback factor beta is -----

- (A)  $1/20$  (B)  **$1/29$**  (C)  $1/25$  (D)  $1/30$

7. In ----- oscillator, two capacitors are placed across a common inductor.

- (A) Phase-shift (B) **Collpit's**  
(C) Wein-bridge (D) Hartley

8 Tank circuit provides phase shift of -----

- (A)  $45^\circ$  (B)  $60^\circ$   
(C)  $360^\circ$  (D)  **$180^\circ$**

9. Oscillator is an electronic circuit which converts ----- energy into a.c. energy.

- (A) a.c. (B) **d.c.**  
(C) solar (D) wind

10. An oscillator circuit uses ----- feedback.

- (A) **positive** (B) negative  
(C) current (D) positive and negative

11. In phase-shift oscillator, the frequency determining elements are -----

- (A) R (B) C  
(C) **R and C** (D) L and C

12. In the Colpitt's oscillator, the frequency determining elements are -----

- (A) R (B) C  
(C) R and C (D) **L and C**

13. Expression for frequency of phase shift oscillator is -----

(A)  $f_o = \frac{1}{2\pi RC}$  (B)  $f_o = \frac{1}{2\pi R\sqrt{6}}$   
(C)  $f_o = \frac{1}{2\pi\sqrt{RC}}$  (D)  $f_o = \frac{1}{2\pi\sqrt{LC}}$

14. Expression for frequency of Colpitt's oscillator is -----

a)  $f_o = \frac{1}{2\pi RC\sqrt{6}}$  b)  $f_o = \frac{1}{2\pi RC}$  c)  $f_o = \frac{1}{2\pi\sqrt{LC}}$  d)  $f_o = 2\pi\sqrt{LC}$

15. In Hartley oscillator, frequency of the oscillations  $f_o$  is -----

a)  $f_o = \frac{1}{2\pi RC\sqrt{6}}$  b)  $f_o = \frac{1}{2\pi RC}$  c)  $f_o = \frac{1}{2\pi\sqrt{LC}}$  d)  $f_o = 2\pi\sqrt{LC}$

15. The equivalent capacitor in Colpitt's or crystal oscillator is given by -----

a)  $C = \frac{C1.C2}{C1+C2}$  (B)  $C = \frac{C1.C2}{C1.C2}$

$$(C) C = \frac{C1 - C2}{C1 + C2} \quad (D) C = \frac{C1 + C2}{C1 - C2}$$

16. The crystal oscillator is used to produce ----- frequencies.

- (A) moderate      (B) low  
**(C) High**      (D) very low

17. Oscillator circuits are useful in -----

- (A) amplifier      **(B) transmitter**  
 (C) receiver      (D) logic gates

18. The condition  $A\beta=1$  is known as -----criterion.

- (A) Collpitt's      (B) Hartley  
 (C) Newton's      **(D) Barkhausen**

**Q.2 Long answer questions for 8 Marks**

i. Explain theory of feedback oscillator. Discuss different cases

**Q.3 Short answer questions for 4 marks**

- i. What is an oscillator? Explain the difference between amplifier and oscillator.
- ii. Explain positive and negative feedback in amplifier and state its advantages
- iii. Explain different types of waveforms in oscillator (5M).
- iv. With suitable diagram, explain the nature of oscillations for tank circuit and expression for frequency
- v. With a neat diagram explain the action/working of Hartley oscillator
- vi. With a neat diagram explain the action of Colpitt's oscillator
- vii. With a neat diagram explain the circuit operation of phase-shift oscillator
- viii. With a neat diagram explain the circuit operation of crystal oscillator

**Unit-II 1.CRO**

**Q.1. Multiple choice questions for 1 mark**

1. A CRO is used to measure -----

- (A) voltage      (B) frequency  
 (C) phase      **(C) all A,B,C**

2. The most accurate device for measuring voltage is -----

- (A) voltmeter      (B) multirneter  
**(C) C.R.O.**      (D) millivoltmeter

3. If the negative potential on the control grid of CRT is increased, the intensity of spot is -----

- (A) increased      **(B) decreased**  
 (C) remains the same      (D) varies

4. The gain control of the vertical amplifier is calibrated in terms of -----

- (A) current      (B) voltane

- (C) Potential                      (D) **deflection sensitivity**
5. ----- is used to obtain required potentials for various electrodes in CRT.  
(A) **potential divider**                      (B) resistor bias  
(C) capacitor bias                      (D) d.c.bias
6. ----- plates are mounted in the vertical plane.  
(A) vertical deflection                      (B) **horizontal deflection**  
(C) electron gun                      (D) control grid
7. CRT stands for -----  
(A) Cathode Ray light Tube                      (B) Caloric Radiation Tube  
(C) **Cathode Ray Tube**                      (D) Cathode Ray Telescope
- 8 The gain of the vertical amplifier can be controlled by the -----  
(A) gain controller                      (B) **input attenuator**  
(C) voltage divider network                      (D) RC network
9. To remove the electrons from the screen, the side walls of CR are coated with -----  
---- particles.  
(A) **carbon**                      (B) phosphor  
(C) zinc                      (D) calcium
- 10 ----- plates are mounted horizontally on the tube.  
(A) **vertical deflection**                      (B) ) horizontal deflection  
(B) electrical                      (D) deflecting
11. Inner wall of CRT is coated with conducting material called -----  
(A) attenuator                      (B) conducting Chanel  
(C) **aquadag**                      (D) carbon chanel
- 12 ----- is an electronic device which is capable to give visual indication of a signal waveform.  
(A) **C.R.O.**                      (B) CRT  
(C) VTVM                      (D) multimeter
- 13 CRO stands for -----  
(A) **Cathode Ray Oscilloscope**                      (B) Cathode Rays Oscillograph  
(C) Cathode Ray Oscillator                      (D) Cathode Rays
- 14 Arrangement of electrodes which produce a focused beam of electrons on screen is called the -----  
(A) electron tube                      (B) **electron gun**  
(C) electronic gun                      (D) electron control
- 15 CRO is basically a ----- plotter.  
(A) **X-Y plotter**                      (B) X-plotter  
(C) Y-plotter                      (D) X-Z plotter
- 16 By varying the negative potential of ----- the intensity of the spot on the screen is controlled.  
(A) anode                      (B) cathode  
(C) **control grid**                      (D) plates

17. When both horizontal and vertical plates are subjected to ac voltages,-----figures are displayed on the screen.  
 (A)geometric (B)beautiful  
**(C) Lissajous** (D)interesting
18. To start the horizontal sweep at a specific instant -----circuit is provided.  
**(A) time base** (B) voltage divider  
 (C) amplifier (D) square wave
19. When ----- voltage is given to X-plates, the spot moves to the right on the screen to reach the maximum distance.  
**(A) saw tooth** (B) sine wave  
 (C) square wave (D) d.c.
- 20) -----produces a narrow beam of electrons which can be focused on the screen.  
 (A) electron tube **(B) electron gun**  
 (C) electronic gun (D) electron control
21. Any unknown voltage to be measured using C.R.O. is applied to ----- input of C.R.O.  
 (A) X **(B) Y** (C) Z (D) X-Y

### **Q.2 Long answer questions for 8 Marks**

- Explain the working principle of CRO. Draw a neat block diagram of CRO and explain the functions of each block.
- Give the construction of CRT and explain the functions of various components.

### **Q.3 Short answer questions for 4 marks**

- Explain in brief any three uses of CRO.
- What are Lissajous figures? How are they produced?
- Explain how frequency of waveform is measured using direct method?
- Explain how frequency of waveform is measured using indirect method (Lissajous figure method)?

### **PROBLEMS**

- An unknown ac voltage is applied to the vertical input of CRO. The VOLT/DIV knob is on position **2 VOLT/DIV**. The vertical peak-to-peak distance of waveform is 4 divisions and the time base knob is on 10 microsec/div. The horizontal spread of waveform is 10 divisions. Find peak-to-peak voltage and frequency of applied signal.

*Ans. : Peak-to-peak voltage = 8V T = 100 μsec, f = 10KHz*

## **2. Operational Amplifier**

### **Q.1 Multiple choice questions for 1 mark**

- Differential amplifier can be used as a building block for -----  
**a) Operational amplifier**                      b) negative feedback amplifier  
 c) positive feedback amplifier              d) feedback amplifier



2) One of the input of differential amplifier is called inverting input because its output is -----

- a) **180° out of phase with input**                      b) in phase with input  
c) in phase as well as out of phase with inputs      d) 90° out of phase with

input

3) Widely used differential amplifier is -----

a) double ended input and output      **b) double ended input and single ended output**

c) single ended input and double ended output      d) single ended input and output

4) In case of differential amplifier, input is applied between -----

- a) emitters of two transistors                      b) collectors of two transistors  
**c) bases of two transistors**                      d) emitters of four transistors

5) Common mode rejection ratio = -----

- a)  $\frac{R_E}{r'_e}$                       b)  $\frac{R_C}{r'_e}$                       c)  $\frac{R_B}{r'_e}$                       d)  $\frac{R}{r'_e}$

6) Input offset voltage is -----

a) the average of both input currents                      b) the difference of the input bias currents

**c) equal to the difference in  $V_{BE}$  values of input transistors**

d) equal to the difference in  $V_{CE}$  values of input transistors

7) Ideal op- amp has -----input impedance

- a) zero                      **b) infinite**                      c) finite                      d) large

8) Op amp amplifies -----

- a) dc signals                      b) ac signals  
**c) both ac & dc signals**                      d) neither ac nor dc signals

9) The closed loop gain of non-inverting amplifier is  $A_{cl}$  = -----

- a)  $\frac{R_f}{R_{in}}$                       b)  $-\frac{R_f}{R_{in}}$                       c)  $1 + \frac{R_f}{R_{in}}$                       d)  $1 - \frac{R_f}{R_{in}}$

10) If the op-amp subtractor circuit has  $R_f = 4R_{in}$  and  $V_1 = 3\text{mV}$  and  $V_2 = 1\text{mV}$ , then its output is ----

- a) 4 mV      b) 1 mV      **c) 0.25 mV**      d) 2.5 mV

11) Op-amp as an inverting amplifier can be used as a integrator by connecting a -----  
--- in feedback path.

- a) resistance      **b) capacitor**      c) inductance      d) diode

12. IC ----- is widely used as an op-amp \*

- (A) **741**      b)742      C)743      d)7401

13. Differential amplifiers uses ----- stages of amplifiers.

- a) four balanced      **b) two balanced**  
c) three balanced      d) two unbalanced

14. How many modes of operation of a differential amplifier?

- a) three      b) two      c) five      **d) four**

15. In case of double ended input and single ended output differential amplifier  
output is taken -----

- a) between emitters of two transistors      b) between collectors of two transistors  
c) between bases of two transistors      **d) between the collector of a transistor  
and ground.**

16. Gain of differential amplifier is -----

- a) very small      **b) very high**      c) zero      d) infinite

17. Common mode rejection ratio is the ratio of----

- a) differential voltage gain to common mode voltage gain**  
b) common mode voltage gain to differential voltage gain  
c) differential voltage gain to common mode current gain  
d) differential current gain to common mode voltage gain

18. Input offset current is -----

- a) the average of both input currents      **b) the difference of the input bias currents**  
c) equal to the difference in  $V_{BE}$  values of input transistors  
d) equal to the difference in  $V_{CE}$  values of input transistors

19. An ideal op-amp- has -----

- a) zero input impedance      b) finite input impedance  
**c) infinite input impedance**      d) infinite output impedance

20. The gain of operational amplifier with feedback is called-----

- a) closed loop gain**      b) infinite loop gain

- c) moderate loop gain      d) open loop gain

21. The closed loop gain of inverting amplifier is  $A_{cl} = \text{-----}$

- a)  $\frac{R_f}{R_{in}}$       b)  $-\frac{R_f}{R_{in}}$       c)  $1 + \frac{R_f}{R_{in}}$       d)  $1 - \frac{R_f}{R_{in}}$

22. If the op-amp subtractor circuit has  $2R_f = R_{in}$  and  $V_1 = 3\text{mV}$  and  $V_2 = 1\text{mV}$ , then its output is ----

- a) **2 mV**      b) 1 mV      c) 0.5 mV      d) 2.5 mV

23. Op-amp as an inverting amplifier can be used as an -----by connecting a capacitor in feedback path in place of feedback resistance.

- a) comparator      b) differentiator  
c) adder/subtractor      **d) integrator**

24. How many transistors are used in the differential amplifier?

- a) only one      **b) only two**      c) one or two      d) more than two

25. One of the input of differential amplifier is called non-inverting input because its output is -----

- a)  $180^\circ$  out of phase with input      **b) in phase with input**  
c) in phase as well as out of phase with inputs      d)  $90^\circ$  out of phase with input

26. In case of double ended output differential amplifier, output is taken across -----

- a) emitters of two transistors      **b) collectors of two transistors**  
c) bases of two transistors      d) emitters of four transistors

27. Differential amplifiers has -----

- a) lower i/p impedance and higher o/p impedance  
**b) very high o/p impedance and low i/p impedance**  
c) higher i/p impedance and lower o/p impedance  
d) higher i/p impedance and higher o/p impedance

28. CMRR stands for -----

- a) Common Mode Referential Ratio      b) Common Mode Reference Ratio  
**c) Common Mode Rejection Ratio**      d) Commercial Mode Reference Ratio

29. Input bias current is -----

- a) the average of both input currents**

- b) the difference of the input bias currents
- c) equal to the difference in  $V_{BE}$  values of input transistors
- d) equal to the difference in  $V_{CE}$  values of input transistors

30. For ideal op-amp open loop gain is -----

- a) zero
- b) greater than one
- c) less than one
- d) infinite**

31. The gain of operational amplifier without negative feedback is called-----

- a) closed loop gain
- b) infinite loop gain
- c) moderate loop gain
- d) open loop gain**

32. If the op-amp subtractor circuit has  $R_f = 2R_{in}$  and  $V_1 = 3\text{mV}$  and  $V_2 = 1\text{mV}$ , then its output is ----

- a) 2 mV
- b) 1 mV
- c) 0.5 mV**
- d) 2.5 mV

33. Op-amp as an inverting amplifier can be used as an -----by connecting a capacitor in feedback path in place of feedback resistance.

- a) comparator
- b) differentiator
- c) adder/subtractor
- d) none of these**

34.) Op-amp as an inverting amplifier can be used as a -----by connecting a capacitor in input path in place of resistance.

- a) comparator
- b) differentiator**
- c) adder/subtractor
- d) integrator

35. The frequency at which the voltage gain equals 1 is called as-----

- (A) Unit gain frequency**
- (B) average frequency
- (C) standard frequency
- (D) stable frequency

36. An ideal Op-Amp has ..... bandwidth

- (A) infinite**
- (B) finite
- (C) limited
- (D) zero

### **Q.2 Long answer questions for 8 Marks**

- i. With a neat diagram, explain the working of differential amplifier.
- ii. Explain with neat diagram different types of differential amplifier.

### **Q.3 Short answer questions for 4 marks**

- i. Differentiate between normal amplifier and differential amplifier.
- ii. Explain the term — (a) Common-mode gain (b) Differential gain (c) CMRR.
- iii. Explain block diagram of operational amplifier.
- iv. State and explain op-amp parameters
- v. Explain with neat diagram the use of Op. Amp as integrator

- vi. Explain with neat diagram t use of Op-Am as differentiator.
- 12. Explain with neat diagram t use of Op-Am as inverting amplifier.
- 13. Explain with neat diagram t use of Op-Am as non-inverting amplifier.
- 14. Explain with neat diagram t use of Op-Am as an adder circuit.
- 15. Explain with neat diagram t use of Op-Am as a subtarctor..

### Topic: Timer IC555

#### Q.1. Multiple choice questions for 1 mark

1. IC 555 consists of ----- comparator  
 (a) **two**                      (b) three                      (c) four                      (d) five
2. ----- R-S flip-flops are present in IC-555.  
 (a) four                      (b) three                      (c) **two**                      (d) one
3. ----- is not a terminal of IC-555 .  
 (a) threshold                      (b) trigger                      (c) **gate**                      (d) reset
4. In IC 555, ----- pin is internally connected to the collector of the Transistor.  
 a) control                      (b) trigger                      (c) discharge                      (d) **threshold**
5. Basic version of IC-555 in package ..... pins.  
 a) **8**                      (b) 10                      (c) 12                      (d) 14
6. Astable multivibrator is also called as -----  
 (A) one shot                      (B) monostable                      (C) bistable                      (D) **free running**
7. Voltage at trigger pin of IC555 is -----  
 (a) 2VCC                      (b) Vcc                      (c) **1/3Vcc**                      (d) 2/3Vcc
8. Voltage at threshold pin of IC555 is -----  
 (a) 2VCC                      (b) Vcc                      (c) 1/3Vcc                      (d) **2/3Vcc**
9. When timer is reset then its output is .....  
 (a) **zero**                      (b) high                      (d) 2Vcc                      (d) V cc
10. ----- multivibrator has no stable state/states.  
 (a) **astable**                      (b)bistable                      (c) mono                      (d) flipflop
10. Monostable multivibrator has ..... stable state and one quasistable state.  
 (a) 0                      (b) **1**                      (c) 2                      (d) 3
11. Number of stable states in bistable multivibrator is .....  
 (a) zero                      (b) 1                      (c) infinite                      (d) **2**
12. The output state of IC-555 timer cannot be changed by changing

voltage at ..... terminal.

(a) discharge (b) trigger (c) threshold (d) reset

13. Pulse width of monostable multivibrator depends on values of-----

(a) RC (b)  $(R_1 + 2R_2) C$  (c)  $(R_1 + R) RC$  (d)  $(2R_1 + R_2)$

14. Frequency of astable multivibrator depends on .....

(a) only  $R_2$  (b) only  $R_1$  (c) only C (d)  **$R_1, R_2$  and C**

15. Duty cycle in astable multivibrator varies between ....

(a) **0 to 0.5** (b) 0.5 to 1 (c) 1 to 1.5 (d) 0 to 1.5

16. ----- multivibrators is used as a memory cell.

(a) **bistable** (b) monostable (c) astable (d) free running

17. ----- requires no trigger input.

(a) bistable (b) monostable (c) **astable** (d) free running

18. Pulse width of monostable multivibrator depends on values of-----

(a) **RC** (b)  $(R_1 + 2R_2) C$  (c)  $(R_1 + R) RC$  (d)  $(2R_1 + R_2)$

19 The time period of Timer 555 astable multivibrator is given by -----

(A)  $T=0.33R_A C$  (B)  $T=1.1(R_A+2R_B).C$  (C)  **$T=0.693(R_A+2R_B).C$**

(D)  $T= (R_A+2R_B).C$

20. The time period of Timer 555 monostable multivibrator is given by -----

(A)  $T=0.33RC$  (B)  **$T=1.1RC$**  (C)  $T=RC$  (D)  $T=0.6RC$

21. Frequency of astable multivibrator depends on .....

(a) only  $R_2$  (b) only  $R_1$  (c) only C (d)  **$R_1, R_2$  and C**

22. Duty cycle in astable multivibrator varies between ....

(a) **0 to 0.5** (b) 0.5 to 1 (c) 1 to 1.5 (d) 0 to 1.5

### **Q.2 Long answer questions for 8 Marks**

1. Draw a block diagram of IC-555 and explain function of each block in it.
2. Give the pin configuration of IC-555 and explain the function of each pin.
3. Explain working of IC 555 as monostable multivibrator with a neat diagram and obtain expression for pulse width .
4. Explain working of IC 555 as astable multivibrator with a neat diagram and obtain expression for frequency . Draw different waveforms of this multivibrator.
5. Explain working of IC 555 as bistable multivibrator with a neat diagram. Draw different waveforms of this multivibrator.

### **Q.3 Short answer questions for 4 marks**

1. Draw a block diagram of IC-555.
2. Give pin configuration of IC-555.
3. Draw a circuit diagram for astable multivibrator using IC-555.

6. Draw a circuit diagram IC555 bistable multivibrator.
7. Derive expression for pulse width of monostable multivibrator.
8. Sketch the waveforms in monostable multivibrator.

===== VVK=====