Subject: - Element of Electronics (22213)

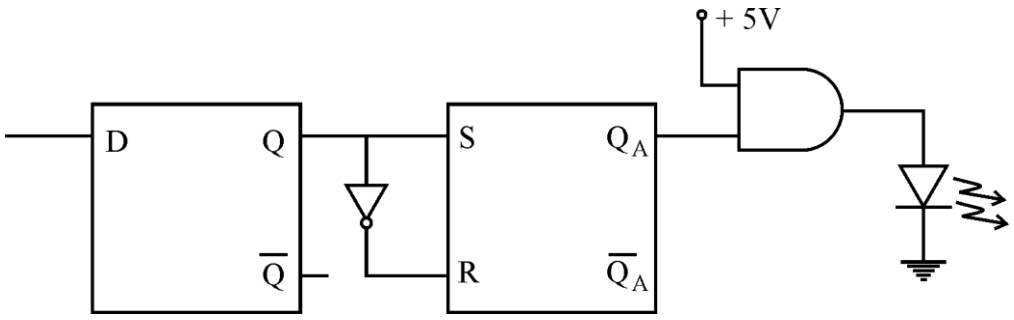
SYLLABUS

Chapter No.	Name of chapter	Marks With Option
1	Use semiconductor Diode	14
2	Rectifiers & filters	14
3	Transistor	20
4	Regulators & Power Supply	20
5	Oscillator	14
6	Digital Electronics	16
	Total Marks :-	98

BOARD THEORY PAPER PATTERN FOR EOE(22213)

Q.1		**Attempt any FIVE** **5*2=10**
	a)	Draw symbol of: i) PN junction diode ii) LED
	b)	Define rectifier and list its types
	c)	Define load and line regulation
	d)	Draw pin configuration of IC 723.
	e)	List configurations of BJT.
	f)	Define Demorgan's theorem first and write it's equation
	g)	Germanium diode knee voltage is lower than silicon diode knee voltage.' Justify.
Q.2		**Attempt any THREE** **3*4=12**
	a)	Sketch block diagram of D.C. regulated power supply. State functions of each block.
	b)	State working principle of photo diode. List out its three applications
	c)	Explain Center-tapped full wave rectifier with the help of circuit diagram and draw input-output waveforms
	d)	State type of feedback used for oscillator circuit. Explain Barkhausen criteria
Q.3		**Attempt any THREE** **3*4=12**
	a)	State relation between emitter current (I_E), Base current (I_B) and collector current (I_C) of BJT.
	b)	Draw experimental circuit diagram and characteristics for forward biased P-N junction diode
	c)	Perform following number system conversion : (i) $(589)_{10} = ()_2$ (ii) $(101101)_2 = ()_{16}$ (iii) $(413)_8 = ()_2$ (iv) $(5AF)_{16} = ()_{10}$
	d)	Sketch circuit diagram of Hartley oscillator. State expression for frequency

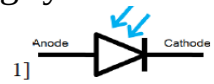
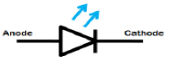
		of oscillation
Q.4		**Attempt any FOUR** **3*4=12**
	a)	Compare BJT common base configurationwith common collecto (i) Current gain (ii) Voltage gain (iii) Input impedance (iv) Output impedance
	b)	Draw output characteristics of common emitter [CE] configuration and explain active, saturation and cut-off regions in detail.
	c)	Draw the circuit diagram of crystal oscillator. Give the basic principle of working of piezoelectric crystal and give the equivalent circuit diagram.
	d)	With the help of circuit diagram and waveform, describe the working of PI type filter.
	e)	Sketch and label V-I characteristics of P-N junction diode. Write steps to calculate dynamic forward bias resistance
Q.5		**Attempt any TWO** **2*6=12**
	a)	Sketch pin configuration of IC 723. State functions of each pin. Sketch circuit diagram for obtaining 6V output d.c. regulated voltage using IC 723.
	b)	Implement the fundamental logic gates 'OR gate', 'AND gate', 'NOT gate' using only NAND gates.
	c)	Draw RC phase shift oscillator and determine frequency of oscillation? How can the frequency of oscillator be changed
Q.6		**Attempt any TWO** **2*6=12**
	a)	Refer the diagram shown in Fig. 4. What should be logic level at D input to make (i) LED ON (ii) LED OFF (iii) Justify your answer by giving step-by-step output of each stage.

		
	b)	Define α, β and γ of transistor and give the relation between α, β and γ of the transistor.
	c)	Construct a dual regulated power supply capable of giving ± 12 V using 78 XX and 79 XX IC's.

CLASS TEST - I
PAPER PATTERN

Syllabus:-

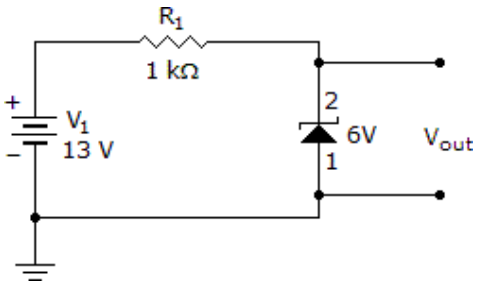
Unit No.	Name of the Unit	Course Outcome (CO)
1	**Use semiconductor Diode**	213.1
2	**Rectifiers & filters**	213.2
3	**Transistor**	213.3

Q.1	Attempt any FOUR 4*2=8Marks	Course Outcome (CO)
a)	Name the components of following symbols 1]  2] 	213.1
b)	List types of filters	213.2
c)	List the four specification of zener diode	213.1
d)	Sketch symbol of following devices *i.* NPN BJT *ii* N channel FET	213.3
e)	Define ripple factor and Knee Voltage of diode,	213.2
Q.2	**Attempt any THREE 3*4=12 Marks**	
a)	Describe advantages and disadvantages of Full Wave rectifier	213.2
b)	State working principle of photo diode. List out its three applications	213.1
c)	Describe the operation of NPN transistor with neat diagram.	213.3
d)	Compare CE,CB,CC	213.3

CLASS TEST - II
PAPER PATTERN

Syllabus:-

Unit No.	Name of the Unit	Course Outcome (CO)
3	**Regulators & Power Supply**	213.4
4	**Oscillator**	213.5
5	**Digital Electronics**	213.6

Q.1	**Attempt any FOUR** 4*2=8Marks	Course Outcome (CO)
a)	List Features of IC 723 Voltage Regulator	213.4
b)	State Barkhausen criteria for obtaining sustained oscillation.	213.5
c)	List the applications of RC oscillator and crystal oscillator. (two each	213.5
d)	 Calculate the current through the Zener diode shown in Figure 1	213.4
e)	Define Load & line regulation	213.4
f)	Convert: $(2E9A)_{16} = (?)_2$	213.6
Q.2	**Attempt any THREE** 3*4=12 Marks	
a)	Construct X-OR gate using only NAND gates.	213.6
b)	A Colpitts Oscillator circuit having two capacitors of 24nF and 240nF and are connected in parallel with an inductor of 10mH. Determine the frequency of oscillations of the circuit, the feedback	213.5

	fraction and draw the circuit diagram.	
c)	Explain working of the Hartley oscillator with circuit diagram.	**213.5**
d)	Construct the D and T flip flop using S R Flip flop.	**213.6**
e)	Explain the process to overcome race around condition	**213.6**

COURSE OUTCOME (CO)

COURSE: - Digital Communication System (22428) **PROGRAMME: - EJ**

CO.NO	Course Outcome
CO-428.1	Analyze various error detection & correction codes in digital communication system
CO-428.2	Use Various pulse code modulation techniques
CO-428.3	Maintain the system based on digital modulation technique
CO-428.4	Multiplex & DE multiplex various digital signals
CO-428.5	Maintain spread spectrum based system

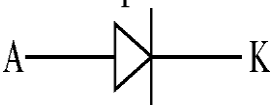
1. Semiconductor Diode

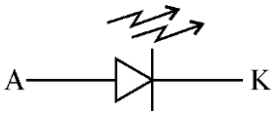
Position in Question Paper **Total Marks-8**

Q.1. a) 2-Marks.
Q.1. c) 2-Marks.
Q.2. b) 4-Marks.

Descriptive Question

1. Name the components of following symbols

(i) 

(ii) 

2. Germanium diode knee voltage is lower than silicon diode knee voltage.' Justify.
3. State working principle of photo diode. List out its three applications
4. Sketch and label V-I characteristics of P-N junction diode. Write steps to calculate dynamic forward bias resistance
5. Draw the symbol of LED & photodiode.
6. Draw experimental circuit diagram and characteristics for forward biased P-N junction diode
7. Describe the working principle of photodiode with proper diagram.
8. Draw symbol of:
   i. PN junction diode
   ii. LED
   iii. Zener diode
   iv. Power diode
9. List any two applications of zener diode , LED, Photodiode
10. Describe the operating principle of Light Emitting Diode (LED) with neat diagram.
11. Draw labeled VI characteristic of PN junction diode and explain
12. Draw labeled VI characteristic of Zener junction diode and explain
13. What is forward biasing of PN junction diode?
14. Explain formation of depletion region.
15. What is reverse biased?
16. Compare PN junction with Zener diode.
17. What is opto-coupler? Write its applications

MCQ Question

(Total number of Question=Marks*3=8*3=24)

Note: Correct answer is marked with **bold**

1. A semiconductor is formed by ___ bonds.
   - **a) Covalent**
   - b) Electrovalent
   - c) Co-ordinate
   - d) None of the above
2. A semiconductor has ___ temperature coefficient of resistance.
   - a) Positive
   - b) Zero
   - **c) Negative**
   - d) None of the above
3. The most commonly used semiconductor is ___
   - a) Germanium
   - **b) Silicon**
   - c) Carbon
   - d) Sulphur
4. When a pentavalent impurity is added to a pure semiconductor, it becomes ___
   - a) An insulator
   - b) An intrinsic semiconductor
   - c) p-type semiconductor
   - **d) n-type semiconductor**
5. Addition of pentavalent impurity to a semiconductor creates many ___
   - **a) Free electrons**
   - b) Holes
   - c) Valence electrons
   - d) Bound electrons
6. A trivalent impurity has ___ valence electrons
   - a) 4
   - b) 5
   - c) 6
   - **d) 3**
7. Addition of trivalent impurity to a semiconductor creates many ___
   - **a) Holes**
   - b) Free electrons
   - c) Valence electrons
   - d) Bound electrons
8. A hole in a semiconductor is defined as ___
   - a) A free electron
   - **b) The incomplete part of an electron pair bond**
   - c) A free proton
   - d) A free neutron
9. The battery connections required to forward bias a pn junction are ___
   - **a) +ve terminal to p and –ve terminal to n**
   - b) -ve terminal to p and +ve terminal to n
   - c) -ve terminal to p and –ve terminal to n
   - d) None of the above
10. In the depletion region of a pn junction, there is a shortage of ___.
    - a) Acceptor ions
    - **b) Holes and electrons**
    - c) Donor ions
    - d) None of the above
11. A pn junction acts as a ___
    - a) Controlled switch
    - b) Bidirectional switch
    - **c) Unidirectional switch**
    - d) None of the above
12. With forward bias to a pn junction , the width of depletion layer ___
    - **a) Decreases**
    - b) Increases

c) Remains the same
d) None of the above

13. A zener diode has ___
a) one pn junction
c) three pn junctions
b) two pn junctions
d) none of the above

14. A zener diode is used as ___
a) an amplifier
c) a rectifier
b) a voltage regulator
d) a multivibrator

15. A zener diode is always ___ connected.
a) reverse
c) either reverse or forward
b) forward
d) none of the above

16.In breakdown region zener diode behaves like a ___source
a) constant voltage
c) constant resistance
b) constant current
d) none of the above

17. A series resistance is connected in the zener circuit to___
a) properly reverse bias the zener
c) properly forward bias the zener
b) protect the zener
d) none of the above

18. A zener diode is ___ device
a) a non-linear
c) an amplifying
b) a linear
d) none of the above

19. A zener diode has ___ breakdown voltage
a) undefined
c) zero
b) sharp
d) none of the above

20. During reverse bias, a small current develops known as
a) Forward current
c) **Reverse saturation current**
b) Reverse current
d) Active current

21. A light emitting diode is___
a) **Heavily doped**
c) Intrinsic semiconductor
b) Lightly doped
d) Zener diode

22. Which of the following materials can be used to produce infrared LED?
a) Si
c) CdS
b) **GaAs**
d) PbS

23. What should be the band gap of the semiconductors to be used as LED?
a) 0.5 eV
c) 1.5 eV
b) 1 eV
d) **1.8 eV**

24. What should be the biasing of the LED?
a) **Forward bias**
c) Forward bias than Reverse bias
b) Reverse bias
d) No biasing required

25.___ has more sophisticated structure than p-i-n photodiode.
a) **Avalanche photodiode**
c) Zener diode
b) p-n junction diode
d) Varactor diode

26. The width of depletion region is dependent on ___ of semiconductor.

a) **Doping concentrations for applied reverse bias**
b) Doping concentrations for applied forward bias
c) Properties of material
d) Amount of current provide

27. Electron-hole pairs are generated in _____
a) **Depletion region**
b) Diffusion region
c) Depletion region
d) P-type region

28. Photodiode is used in the detection of
a) Visible light
b) Invisible light
c) No light
d)Both visible and invisible light

29. In a photodiode, when there is no incident light, the reverse current is almost negligible and is called
a) Zener current
b)Dark current
c) Photocurrent
d) PIN current

30. The width of the depletion region is
a) Directly proportional to the doping
b)inversely proportional to the doping
c) Independent of doping
d) None of the above

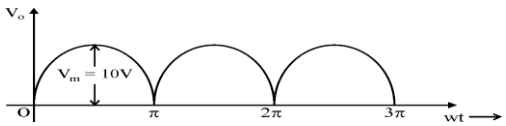
2. Rectifiers & Filters

Position in Question Paper **Total Marks-12**

Q.1. b) 2-Marks.
Q.1.e) 2-Marks
Q.2. c) 4-Marks.
Q.3. b) 4-Marks.

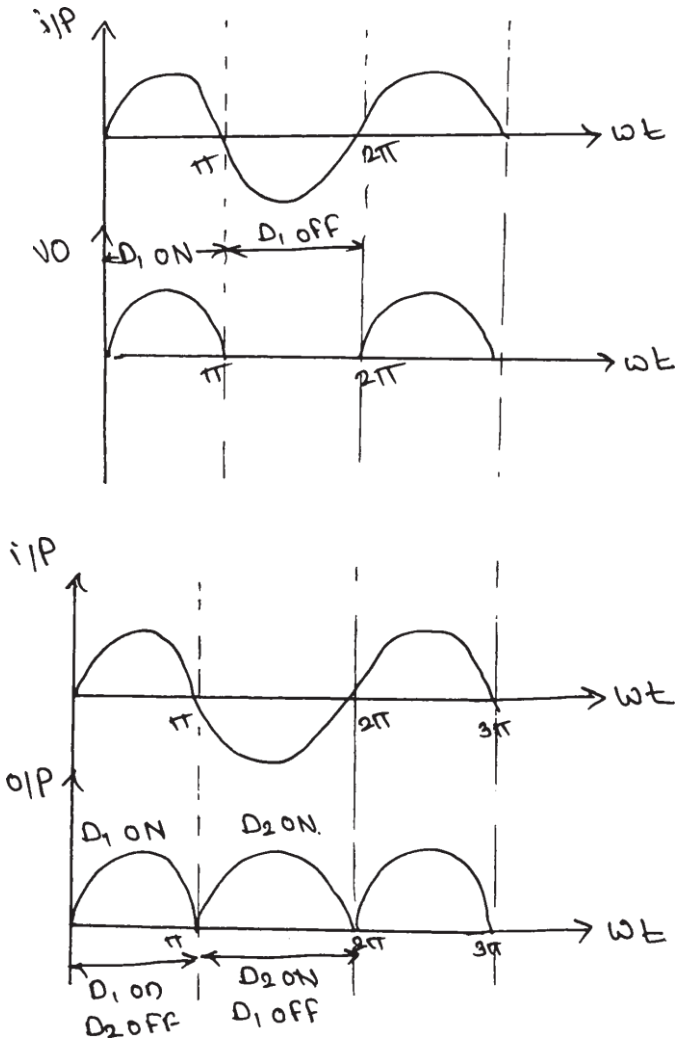
Descriptive Question

1. Define the term Ripple factor, TUF, Efficiency, PIV, for rectifier
2. Sketch circuit diagram and input, output waveform of half wave rectifier. State its efficiency
3. Name the type of rectifier for each of following feature :
   i. Highest rectifier efficiency
   ii. Highest form factor
   iii. Two diode rectifier circuit
   iv. PIV = $2V_m$
4. Sketch circuit diagram of bridge rectifier with LC filter. State function of each component
5. Explain operation of series inductor filter and find out its ripple factor.
6. Define rectifier and list its types.
7. Suggest the suitable diode type for rectifier circuit.
8. Explain Center-tapped full wave rectifier with the help of circuit diagram and draw input-output waveforms.
9. An AC supply of 230 V is applied to half wave rectifier circuit. A transformer turns ratio is 20: 1. Find
   i. Output DC voltage (ii) Peak Inverse Voltage (PIV)
10. Draw the circuit diagram of bridge rectifier with PI filter. Draw its input and output waveform.
11. In a full wave rectifier V_m = 10 V, R_L = 10 k. Find out V_{dc}, I_{dc} and Ripple factor.



12. Name the different types of filter.
13. Draw the circuit diagram of full wave bridge rectifier and describe its working.
14. In full wave bridge rectifier Vm= 10 V RL = 10 k. Find out V_{DC}, I_{DC}, ripple factor and P_{IV}.
15. Compare HWR, FWCR, Full wave Bridge.
16. Compare L,LC ,shunt & CLC(PI) type filter.

17. With the help of circuit diagram and waveform, describe the working of PI type filter.
18. Draw the circuit diagram for the following input-output waveform of rectifier (Refer Fig. No. 1 and Fig. No. 2)



MCQ Question

(Total number of Question=Marks*3=8*3=24)

Note: Correct answer is marked with **bold**

1. Which of the following isn't a type of rectifier?
   a) Precision Half-wave Rectifier
   b) Bridge Rectifier
   c) Peak Rectifier
   d) None of the mentioned
2. For a half wave or full wave rectifier the Peak Inverse Voltage of the rectifier is always
   a) Greater than the input voltage
   b) Smaller than the input voltage
   c) Equal to the input voltage
   d) Greater than the input voltage for full wave rectifier and smaller for the half wave rectifier

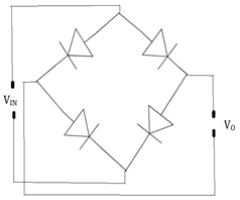
3. Bridge rectifier is an alternative for
a) Full wave rectifier
c) Half wave rectifier
b) Peak rectifier
d) None of the mentioned

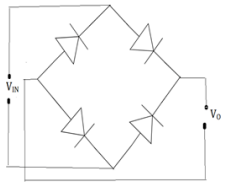
4. Efficiency of a centre tapped full wave rectifier is _____
a) 50%
c) 70%
b) 46%
d) 81.2%

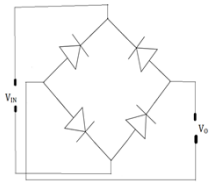
5. If input frequency is 50Hz for a full wave rectifier, the ripple frequency of it would be __
a) 100Hz
c) 25Hz
b) 50Hz
d) 500Hz

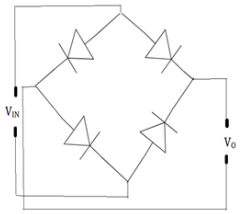
6. Transformer utilization factor of a centre tapped full wave rectifier is_____
a) 0.623
c) 0.693
b) 0.678
d) 0.625

7. In the circuits given below, the correct full wave rectifier is _____

a) 

c) 

b) 

d) 

8. The diode in a half wave rectifier has a forward resistance RF. The voltage is $V_m \sin\omega t$ and the load resistance is RL. The DC current is given by _____
a) $V_m/\sqrt{2}R_L$
c) $2V_m/\sqrt{\pi}$
b) $V_m/(R_F+R_L)\pi$
d) V_m/R_L

9. Efficiency of a half wave rectifier is
a) 50%
c) 40.6%
b) 60%
d) 46%

10. Transformer utilisation factor of a half wave rectifier is _____
a) 0.234
c) 0.287
b) 0.279
d) 0.453

11. If the input frequency of a half wave rectifier is 100Hz, then the ripple frequency will be
a) 150Hz
c) 100Hz
b) 200Hz
d) 300Hz

12. Ripple factor of a half wave rectifier is__(I_m is the peak current and RL is load resistance)
a) 1.414
c) 1.4
b) 1.21
d) 0.48

13. DC average current of a bridge full wave rectifier (where I_m is the maximum peak current of input).

a) $2I_m$
b) I_m
c) $I_m/2$
d) $1.414I_m$

14. DC power output of bridge full wave rectifier is equal to (I_m is the peak current and RL is the load resistance).
a) $2\ I_m^2R_L$
b) $4\ I_m^2R_L$
c) $I_m^2R_L$
d) $I_m^2\ R_L/2$

15. Ripple factor of bridge full wave rectifier is?
a) 1.414
b) 1.212
c) 0.482
d) 1.321

16. If input frequency is 50Hz then ripple frequency of bridge full wave rectifier will be equal to_____
a) 200Hz
b) 50Hz
c) 45Hz
d) 100Hz

17. Transformer utilization factor of bridge full wave rectifier _____
a) 0.623
b) 0.812
c) 0.693
d) 0.825

18. Efficiency of bridge full wave rectifier is_____
a) 81.2%
b) 50%
c) 40.6%
d) 45.33%

19. In a bridge full wave rectifier, the input sine wave is 40sin100t. The average output voltage is_____
a) 22.73V
b) 16.93V
c) 25.47V
d) 33.23V

20. Number of diodes used in a full wave bridge rectifier is_____
a) 1
b) 2
c) 3
d) 4

21. In a bridge full wave rectifier, the input sine wave is 250sin100t. The output ripple frequency will be_____
a) 50Hz
b) 200Hz
c) 100Hz
d) 25Hz

22. What is the number of capacitors and inductors used in a CLC filter?
a) 1, 2 respectively
b) 2, 1 respectively
c) 1, 1 respectively
d) 2, 2 respectively

23. Major part of the filtering is done by the first capacitor in a CLC filter because _____
a) The capacitor offers a very low reactance to the ripple frequency
b) The capacitor offers a very high reactance to the ripple frequency
c) The inductor offers a very low reactance to the ripple frequency
d) The inductor offers a very high reactance to the ripple frequency

24. The inductor is placed in the L section filter because_____
a) It offers zero resistance to DC component
b) It offers infinite resistance to DC component
c) It bypasses the DC component
d) It bypasses the AC component

25. The advantages of a pi-filter is_____
a) low output voltage
c) low ripple factor
b) low PIV
d) high voltage regulation

26. The value of inductance at which the current in a choke filter does not fall to zero is_____
a) peak inductance
c) critical inductance
b) cut-in inductance
d) damping inductance

27. In a shunt capacitor filter, the mechanism that helps the removal of ripples is_____
a) The current passing through the capacitor
b) The property of capacitor to store electrical energy
c) The voltage variations produced by shunting the capacitor
d) Uniform charge flow through the rectifier

28. Which of the following are true about capacitor filter?
a) It is also called as capacitor output filter
b) It is electrolytic
c) It is connected in parallel to load
d) It helps in storing the magnetic energy

29. Number of diodes present in HWR are
a) 1
c) 3
b) 2
d) 4

30. Number of diodes present in FWCR is/are
a) 1
c) 3
b) 2
d) 4

31. Center tap transformer is used in
a) HWR
c) Bridge
b) FWCR
d) None

32. 2Vm is PIV of
a) HWR
c) Bridge
b) FWCR
d) Both b & C

33. Maximum rectification efficiency of HWR is
a)40%
c) 69.3%
b) 81.2%
d) None

34. Which of the following is not a type of filter
a) C type
c) FWR
b) CLC type
d) L type

35. In a bridge full wave rectifier, the input sine wave is 250sin100t. The output ripple frequency will be_____
a) 50Hz
c) 100Hz
b) 200Hz
d) 25Hz

36.In which type of filter we get better voltage regulation
a) C type
c) CLC/Pi type filter
b) L type
d) None

3. Transistor

Position in Question Paper **Total Marks-18**

Q.1.d) 2-Marks
Q.2.d) 4-Marks
Q.5.b) 6-Marks
Q.6.a) 6- Marks

Descriptive Question

1. State relation between emitter current (I_E), Base current (I_B) and collector current (I_C) of BJT.
2. Compare BJT common base configuration with common collector configuration on the basis of
   i. Current gain
   ii. Voltage gain
   iii. Input impedance
   iv. Output impedance
3. State condition for both junctions to operate BJT in cut off state, Active state and saturation state.
4. In a common base configuration, the emitter current is 1 mA. If the emitter circuit is open, the collector current is 50 □A. Find total collectors current. Assume □ (Alpha) = 0.92.
5. A transistor is connected in common emitter (CE) configuration with collector supply V_{CC} of 8V. Voltage drop across resistance RC connected in series with collector is 0.5 V. The value of RC is 800 □. If alpha (□) equal to 0.96, calculate :
   i. Collector-emitter voltage
   ii. Collector current
   iii. Base current
6. For common emitter configuration sketch input characteristics for two different values of V_{CE} and output characteristics for two different values of I_B. Write formula for input resistance and output resistance.
7. List configurations of BJT.
8. Describe the operation of NPN transistor with neat diagram.
9. Describe transistor as a switch with neat sketch
10. Identify type of BJT configuration having following features :
    i. BJT configuration having the least current gain.
    ii. BJT configuration called as voltage follower.
    iii. BJT configuration having current gain less than one.
    iv. BJT configuration suitable for impedance matching.
    v. BJT configuration suitable for voltage amplification.

vi. BJT configuration having the least output impedance

11. Draw output characteristics of common emitter [CE] configuration and explain active, saturation and cut-off regions in detail.
12. For a transistor □ = 0.98 and IC = 4 mA. Calculate IB and IE.
13. Define current gain of a transistor.

MCQ Question

(Total number of Question=Marks*3=18*3=54)

Note: Correct answer is marked with **bold**

1. Which of the following condition is true for cut-off mode?
   a) The collector current Is zero
   b) The collector current is proportional to the base current
   c) The base current is non zero
   d) All of the mentioned
2. Which of the following is true for the cut-off region in an npn transistor?
   a) Potential difference between the emitter and the base is smaller than 0.5V
   b) Potential difference between the emitter and the base is smaller than 0.4V
   c) The collector current increases with the increase in the base current
   d) The collector current is always zero and the base current is always non zero
3. Which of the following is true for the active region of an npn transistor?
   a) The collector current is directly proportional to the base current
   b) The potential difference between the emitter and the collector is less than 0.4 V
   c) All of the mentioned
   d) None of the mentioned
4. Which of the following is true for a pnp transistor in active region?
   a) CB junction is reversed bias and the EB junction is forward bias
   b) CB junction is forward bias and the EB junction is forward bias
   c) CB junction is forward bias and the EB junction is reverse bias
   d) CB junction is reversed bias and the EB junction is reverse bias
5. Which of the following is true for a pnp transistor in saturation region?
   a) CB junction is reversed bias and the EB junction is forward bias
   b) CB junction is forward bias and the EB junction is forward bias
   c) CB junction is forward bias and the EB junction is reverse bias
   d) CB junction is reversed bias and the EB junction is reverse bias
6. The correct relation between the transistor parameters α and ß are related by
   a) ß = 1 – α/α
   b) ß = 1 + α/α
   c) α = ß + 1/ß
   d) α = ß/ß + 1
7. The correct expression relating the emitter current Ie to the collector current Ic is
   a) Ie = α Ic
   b) Ic = α Ib
   c) Ie = ß Ic
   d) Ic = ß Ic
8. The correct relation between the emitter current Ie and the base current Ib is given by

a) Ib = (1 + α) Ie
b) Ib = (α – 1) Ie
c) Ie = (1 – ß) Ib
d) Ie = (1 + ß) Ib

9. Which of the following is not a part of a BJT?
a) Base
b) Collector
c) Emitter
d) None of the mentioned

10. The number of pn junctions in a BJT is/are
a) 1
b) 2
c) 3
d) 4

11. In which of the following modes can a BJT be used?
a) Cut-off mode
b) Active mode
c) Saturation mode
d) All of the mentioned

12. If a BJT is to be used as an amplifier, then it must operate in_____
a) Cut-off mode
b) Active mode
c) Saturation mode
d) All of the mentioned

13. If a BJT is to be used as a switch, it must operate in_____
a) Cut-off mode or active mode
b) Active Mode or saturation mode
c) Cut-off mode or saturation mode
d) Cut-off mode or saturation mode or active mode

14. In cut off mode
a) The base-emitter junction is forward biased and emitter-collector junction is reversed biased
b) The base-emitter junction is forward biased and emitter-collector junction is forward biased
c) **The base-emitter junction is reversed biased and emitter-collector junction is reversed biased**
d) The base-emitter junction is reversed biased and emitter-collector junction is forward biased

15. When transistors are used in digital circuits they usually operate in the:
a) active region
b) breakdown region
c) saturation and cutoff regions
d) linear region

16. What is one important thing transistors do?
a) Amplify weak signals
b) Rectify line voltage
c) C. Regulate voltage
d) Emit light

17. In an npn transistor, the majority carriers in the base are
a) Free electrons
b) Holes
c) Neither
d) Both

18. The emitter diode is usually
a) Forward-biased
b) Reverse-biased
c) Nonconducting
d) Operating in the breakdown region

19. The base of an npn transistor is thin and
a) Heavily doped
b) Lightly doped

c) Metallic
d) Doped by a pentavalent material

20. Most of the electrons in the base of an npn transistor flow
a) Out of the base lead
c) Into the emitter
b) Into the collector
d) Into the base supply

21. The emitter diode is usually
a) Forward-biased
c) Nonconducting
b) Reverse-biased
d) Operating in the breakdown region

22. For normal operation of the transistor, the collector diode has to be
a) Forward-biased
c) Nonconducting
b) Reverse-biased
d) Operating in the breakdown region

23. The current gain of a transistor is the ratio of the
a) Collector current to emitter current
c) Base current to collector current
b) Collector current to base current
d) Emitter current to collector current

24. The fact that only a few holes are in the base region means the base is
a) Lightly doped
c) Undoped
b) Heavily doped
d) None of the above

25. What is the most important fact about the collector current?
a) It is measured in milliamperes.
b) It equals the base current divided by the current gain.
c) It is small.
d) It approximately equals the emitter current

26. A transistor acts like a diode and a
a) Voltage source
c) Resistance
b) Current source
d) Power supply

27. What happens to the collector current if the emitter current increases while no base voltage is applied?
a) Increases
c) No current
b) Decreases
d) First increases then decreases

28. Which terminal of the diode is common to the other two terminals of the diode?
a) Base is common to collector and emitter
b) Emitter is common to collector and base
c) Collector is common to base and emitter
d) No terminal is common to any other

29. Which is an example of bipolar junction transistor?
a) BC547B
c) SLB700A/06VA
b) CMCP793V-500
d) MBR5H100MFST1G

30. What is the minimum voltage required to make base emitter junction of a real silicon bipolar junction transistor in forward biased?
a) 0.7 volts
c) 2.3 volts
b) 1.8 volts
d) 0.3 volts

31. When bipolar junction transistor acts as an amplifier?

a) When base emitter terminal is forward biased and base collector terminal is reverse bias

b) When base emitter terminal is reverse biased and base collector terminal is reverse bias

c) When base emitter terminal is reverse biased and base collector terminal is forward bias

d) When base emitter terminal is forward biased and base collector terminal is forward bias

32. In CE configuration base current amplification factor β is given by_____

a) I_C/I_B
c) I_E/I_B
b) I_B/I_C
d) I_B/I_E

33. In an NPN silicon transistor, α=0.995, I_E=10mA and leakage current I_{CBO}=0.5μA. Determine I_{CEO}.

a) 10μA
c) 90μA
b) 100μA
d) 500μA

34. The relation between α and β is_____

a) β = α/ (1-α)
c) β = α/ (1+α)
b) α = β/(1+β)
d) α = β/(1- β)

35. In I_{CEO}, wt does the subscript 'CEO' mean?

a) collector to base emitter open
c) collector to emitter base open
b) emitter to base collector open
d) emitter to collector base open

36. A transistor has an I_C of 100mA and I_B of 0.5mA. What is the value of αdc?

a) 0.787
c) 0.543
b) 0.995
d) 0.659

37. In CB configuration, the value of α=0.98A. A voltage drop of 4.9V is obtained across the resistor of 5KΩ when connected in collector circuit. Find the base current.

a) 0.01mA
c) 0.02mA
b) 0.07mA
d) 0.05mA

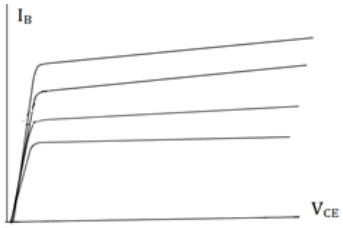
38. The relation between α and β is _____

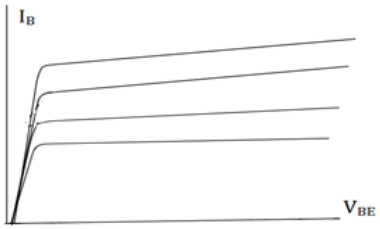
a) β=α/(1-α)
c) β=α/(1+α)
b) α= β/(1+β)
d) α= β/(1- β)

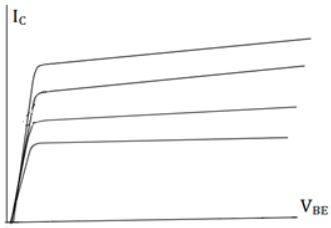
39. A transistor has an I_E of 0.9mA and amplification factor of 0.98. What will be the I_C?

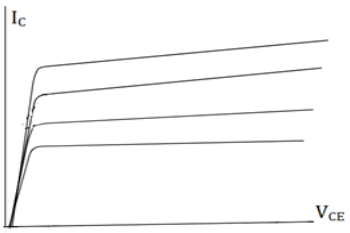
a) 0.745mA
c) 0.236mA
b) 0.564mA
d) 0.882mA

40. Which of the following depicts the output characteristics of a CE transistor?

a) 

b) 

c) 

d) 

41. When the collector junction is reverse biased and emitter junction is forward biased, the operating region of the transistor is called_____
   a) inverted region
   b) active region
   c) cut off region
   d) cut in region

42. The current amplification factor ϒdc is given by_____
   a) I_E/I_B
   b) I_B/I_E
   c) I_C/I_E
   d) I_E/I_C

43. he application of a CC configured transistor is_____
   a) voltage multiplier
   b) level shifter
   c) rectification
   d) impedance matching

44. When is the transistor said to be saturated?
   a) when V_{CE} is very low
   b) when V_{CE} is very high
   c) when V_{BE} is very low
   d) when V_{BE} is very high

45. In CE, CB & CC which terminal is common respectively
   a) Emitter, Base, Collector
   b) Base, Emitter, Collector
   c) Collector, Base, Emitter
   d) None

46. Current gain (βdc) of Common Emitter configuration is?
   a) I_E/I_B
   b) I_B/I_E
   c) I_C/I_B
   d) I_E/I_C

47.BJT Stands for
   a) Bipolar junction Transistor
   b) Bipolar Junction Transformer
   c) Both a & B
   d) None

48. The CC configuration has an input resistance_____
   a) 500kΩ
   b) 750kΩ (Hint: Very High)
   c) 600kΩ
   d) 400kΩ

49. What is the output resistance of CC transistor?
   a) 25 Ω (Hint: Very Low)
   b) 50 Ω
   c) 100 Ω
   d) 150 Ω

50. The point on the DC load line which is represented by 'Q' is called _____
   a) cut off point
   b) cut in point
   c) breakdown point
   d) operating point

51. Input voltage for CE,CB & CC configuration is___respectively
a) VBE, VEB, VBC
c) VBE,VCB, VEB
b) VEB, VCB, VBE
d) None

52. Output Voltage of CE,CB & CC configuration is ___Respectively
a) VCE, VCB, VBC
c) VBC, VCB, VCE
b) VCB, VBC, VCE
d) None

53. Voltage Gain of CE,CB & CC configuration is ___Resp.
a) Medium, Medium, Less than 1
c) Medium High, Low
b) High, High, Low
d) None

54. The application of a CC configured transistor is_____
a) voltage multiplier
c) rectification
b) level shifter
d) impedance matching

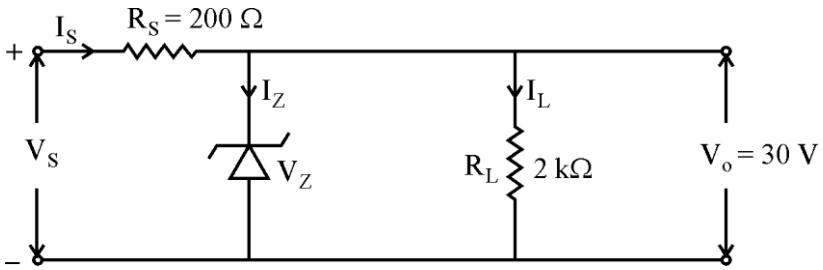
4. Regulated Power Supply

Position in Question Paper **Total Marks-12**

Q.2. d) 4-Marks
Q.3 a) 4-Marks
Q.4 b) 4-Marks

Descriptive Questions

1. Write three terminal voltage regulator IC for obtaining :
   (i) + 5V (ii) –12V
2. Define the term 'Load Regulation'.
3. Sketch block diagram of D.C. regulated power supply. State functions of each block.
4. . Explain with circuit diagram operation of zener diode as a voltage regulator
5. Define the term line regulation.
6. Draw block diagram of IC 723. Write the functions of IC 723.
7. Find out the input voltage of the zener regulator shown in Fig. 2. Assume R_S = 200 ohm and I_Z (max) = 25 mA



MCQ Question

(Total number of Question=Marks*3=12*3=36)

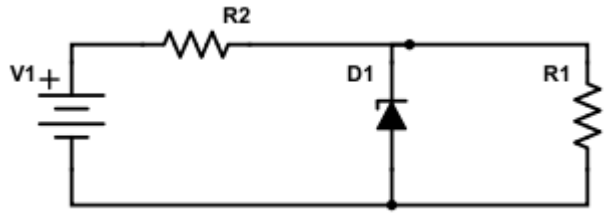
Note: Correct answer is marked with **bold**

1. Which of the following can be a source of supply in dc power supplies?
   a) Battery
   b) Dry cell
   c) Full wave rectifier
   d) All of the mentioned
2. Which of the following represent a change of output voltage when load current is increased?
   a) Line regulation
   b) Load regulation
   c) Current regulation
   d) Voltage regulation
3. Why zener diodes are provided in dc supply?
   a) For forward conduction
   b) For reverse conduction
   c) For reference voltage
   d) For increasing amplitude
4. Which of the following can be used as a comparator?
   a) Zener diode
   b) Diode
   c) Operational amplifier
   d) All of the mentioned
5. In an unregulated power supply, if load current increases, the output voltage__

a) Remains the same
b) Decreases
c) Increases
d) None of the above

6. What is IC 723?
a) A voltage regulator
b) A full-wave rectifier
c) A half-wave rectifier
d) A clipper

7. Consider the circuit shown below where the breakdown voltage of the diode is 5V. Source voltage varies between 6V to 12V.

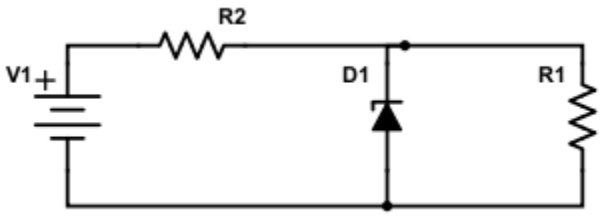


Find the maximum current through the R2, given that R1=2kΩ and R2=5kΩ.
a) 3.5 mA
b) 1 mA
c) 1.4mA
d) 0.2 mA

8. What is line regulation?
a) The process of keeping Zener diode voltage constant inspite of changes in AC supply
b) The process of keeping load voltage constant irrespective of the fluctuation in AC supply or the line voltage
c) The process of keeping load voltage constant irrespective of fluctuation in load current
d) The process of keeping Zener current constant irrespective of fluctuation in AC supply

9. What is load regulation?
a) The process of keeping the load voltage constant irrespective of any change in AC supply
b) The process of keeping the load voltage constant irrespective of variations in load current
c) The process of keeping load voltage constant irrespective of variations in source current
d) The process of keeping load current constant irrespective of variations in AC supply

10. The following circuit is provided.



Given that V1 varies from 20V to 50V, the diode breakdown voltage is 5V, the knee current is 1mA and the current is 9 mA across R1, find the maximum value of R2.
a) 4500Ω
b) 1500Ω
c) 2000Ω
d) 5000Ω

11. Which of these is a not drawback of Zener diode shunt regulator?
a) The output voltage is fixed
b) The output voltage can vary with temperature

c) Variation in load current needs to be minimal
d) It is difficult to design

12. What is the output of the IC 7924?
a) 12V
b) -12V
c) 24V
d) -24V

13. In the IC 7805, what is the minimum input voltage for proper functioning?
a) 5V
b) 6V
c) 7V
d) 8V

15. Which among the following are regarded as three-pin voltage regulator ICs?
a) Fixed voltage regulators
b) Adjustable voltage regulators
c) Both a and b
d) None of the above

16. Due to operation of series pass transistor in an active region of linear voltage regulator,
a) The ripple contents in o/p voltage waveform is very low
b) Then there is no necessity of using high speed transitor
c)Both a and b
d) None of the above

17. In LM317 voltage regulator, what is the minimum value of voltage required between its input & output in order to supply power to an internal circuit?
a) 1V
b) 3V
c) 5V
d) 10V

18. The % load regulation of a power supply should be ideally __ & practically___
a) zero, small
b) small, zero
c) zero, large
d) large, zero

19. Which performance parameter of a regulator is defined as the change in regulated load voltage due to variation in line voltage in a specified range at a constant load current?
a) Load regulation
b) Line regulation
c) Temperature stability factor
d) Ripple rejection

20. Which among the following factors affect/s the output voltage of a regulated power supply?
a) Load current
b) Input voltage
c) Temperature
d) All of the above

21. Voltage regulators require
a) Only line regulation
b) Only load regulation
c) A constant load
d) Load and line regulation

22. Voltage regulators keep a constant ____output voltage when the input or load varies within limits.
a) DC
b)AC
c)Ripple
d) None

23. The output voltage of a regulated power supply is affected by which of the following factors
a) Input voltage
b) Load current
c) Temperature
d) All the above

24. The change in voltage from no-load to full-load condition.
a) Voltage Regulation
c) Load Regulation
b) Line Regulation
d)None

25. Which is not considered as a linear voltage regulator?
a) Fixed output voltage regulator
c) Switching regulator
b) Adjustable output voltage regulator
d) Special regulator

26. To get a maximum output current, IC regulation are provided with
a) Radiation source
c) Peak detector
b) Heat sink
d) None of the mentioned

27. Which type of regulator is considered more efficient?
a) All of the mentioned
c) Fixed output regulator
b) Special regulator
d) Switching regulator

28. The change in output voltage for the corresponding change in load current in a 7805 IC regulator is defined as
a) All of the mentioned
c) Load regulation
b) Line regulation
d) Input regulation

29. Which of the following is not a characteristic of adjustable voltage regulators?
a) Non-versatile
c) Increased reliability
b) Better performance
d) None of the mentioned

30. Number of diodes present in FWCR is/are
a) 1
c) 3
b) 2
d) 4

31. Center tap transformer is used in
a) HWR
c) Bridge
b) FWCR
d) None

32. 2Vm is PIV of
a) HWR
c) Bridge
b) FWCR
d) Both b & C

33. Maximum rectification efficiency of HWR is
a) 40%
c) 69.3%
b) 81.2%
d) None

34. Which of the following is not a type of filter
a) C type
c) FWR
b) CLC type
d) L type

35. In a bridge full wave rectifier, the input sine wave is 250sin100t. The output ripple frequency will be_____
a) 50Hz
c) 100Hz
b) 200Hz
d) 25Hz

36.In which type of filter we get better voltage regulation
a) C type
c) CLC/Pi type filter
b) L type
d) None

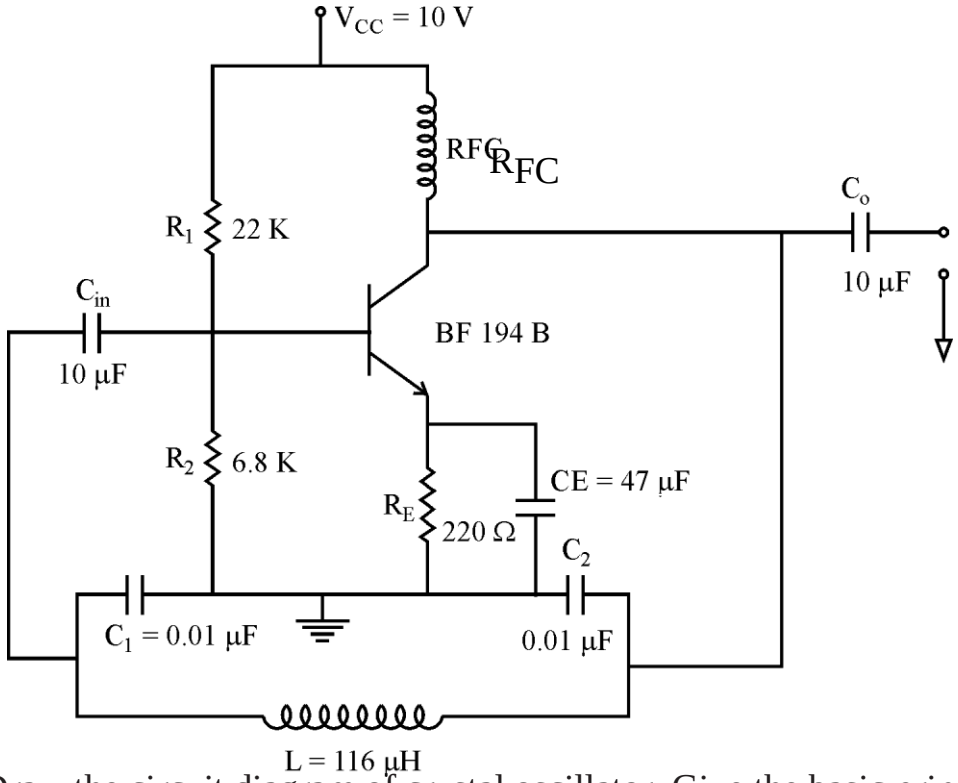
5. Oscillator

Position in Question Paper **Total Marks-10**

Q.1. c) 2-Marks
Q.3 d) 4-Marks
Q.4 c) 4-Marks

Descriptive Questions

1. State type of feedback used for oscillator circuit. Explain Barkhausen criteria.
2. Sketch circuit diagram of Hartley oscillator. State expression for frequency of oscillation.
3. Differentiate between positive and negative feedback on the basis of :
   i. overall phase shift (ii) voltage gain
   (iii) Stability (iv) applications
4. List the applications of RC oscillator and crystal oscillator. (two each)
5. Identify the circuit shown in Fig. 3. Find out frequency of oscillator of the Circuit. + V_{CC} = 10 V



6. Draw the circuit diagram of crystal oscillator. Give the basic principle of working of piezoelectric crystal and give the equivalent circuit diagram.
7. Compare positive and negative feedback (any four points).
8. Draw RC phase shift oscillator and determine frequency of oscillation? How can the frequency of oscillator be changed

9. Compare RC & LC filter
10. Explain working of crystal oscillator.
11. Explain working principle of Colpitt's oscillator.

MCQ Question

(Total number of Question=Marks*3=10*3=30)

Note: Correct answer is marked with **bold**

1. In LC Oscillator frequency of oscillation is ____L or C
   a)proportional to square of
   b)directly proportional to
   c)independent of the values of
   d)inversely proportional to square root of
2. Qurtz crystal is commonly used in crystal oscillator because
   a)It has superior electrical properties
   b)it is easily available
   c)it is quite inexpensive
   d)none of the above
3. Hartely oscillator is commonly used in
   a)Radio receivers
   b)radio transmitters
   c)tv receivers
   d)none of the above
4. Which of the following is not an LC oscillator?
   a) Hartley Oscillator
   b) Colpitts oscillator
   c) Crystal oscillator
   d) Clapp oscillator
5. The sinusoidal oscillator is also called _____
   a) LC oscillator
   b) Harmonic oscillator
   c) RC oscillator
   d) Crystal oscillators
6. Which type of oscillators is used in timing elements?
   a) RC oscillator
   b) LC oscillator
   c) Crystal oscillator
   d) Weinbridge oscillator
7. Which of the following oscillator is not using a feedback network for its oscillation?
   a) LC oscillator
   b) RC oscillator
   c) Crystal oscillator
   d) Relaxation oscillators
8. Low frequency oscillators have a frequency range of _____
   a) 20 Hz-20K Hz
   b) 20 Hz -100k Hz
   c) 1 Hz -20k Hz
   d) 50 Hz -100k Hz
9. High frequency oscillators have a frequency range of _____
   a) 300K Hz-2G Hz
   b) 100k Hz-500k Hz
   c) 8k Hz-800K Hz
   d) 4K Hz-1G Hz
10. Which of the following oscillator cannot be used in low frequency oscillations?
    a) Wein bridge oscillators
    b) RC phase shift oscillators
    c) Colpitts oscillators
    d) RC oscillators
11. Which of the following oscillator is will give the most stable output oscillation frequency?
    a) Colpitts oscillator
    b) Clapp oscillator
    c) Wein bridge oscillator
    d) Crystal oscillator

12. Damped oscillations are those oscillations which _____ continuously with time.
a) Increasing
c) Increasing or decreasing
b) Decreasing
d) Neither increasing nor decreasing

13. If the oscillation amplitude decreases continuously it is called _____
a) Overdamped
c) Sustained
b) Underdamped
d) No specific name

14. If oscillation amplitude increases continuously it is called _____
a) Overdamped
c) Sustained
b) Underdamped
d) No specific name

15. Which of the following is not an example of sinusoidal oscillator?
a) RC phase shift oscillator
c) Crystal oscillator
b) Weinbridge oscillator
d) Blocking oscillator

16. Oscillators are used to _____ AC voltage.
a) Prevent
c) Amplify
b) Generate
d) Rectify

17. Oscillator _____ an AC input for giving an AC output.
a) Doesn't need
c) Doesn't need at lower frequencies
b) Need
d) Doesn't need at higher frequencies

18. The AC power of output signal is obtained by _____
a) Input AC voltage
c) DC biasing voltage
b) Input DC voltage
d) Power is generated by transistor itself

19. The output of a stable oscillator have _____
a) Constant amplitude & frequency
b) Varying amplitude
c) Constant amplitude at high frequencies only
d) Constant amplitude at low frequencies only

20. The output of oscillator will not depend upon _____
a) Feedback
c) Both feedback and amplifier
b) Amplifier
d) Input voltage

21. RC phase shift oscillators contain a minimum of _____ Phase shift network.
a) 1
c) 3
b) 2
d) 0

22. One phase shift network of an RC phase contain _____ inductor.
a) 1
c) 3
b) 2
d) 0

23. One phase shift network of an RC phase contain _____ resistor.
a) 1
c) 3
b) 2
d) 0

24. Phase shift provided by one phase shift network in RC phase shift oscillator in 3 stage is
a) 180 degrees
c) 120 degrees
b) 60 degrees
d) 90 degrees

25. Total phase shift provided by all phase shift networks in RC phase shift oscillator is __

a) 180 degrees
c) 120 degrees
b) 60 degrees
d) 360 degrees

26. The phase shift network will produce a phase shift of 180 degrees at _____
a) Three different frequencies
c) Two different frequencies
b) One frequency
d) Infinitely many frequencies

27. Amplifier gain for RC phase shift oscillation, to obey Barkhausen's criteria should be minimum of _____
a) 43
c) 10
b) 4
d) 29

28. Frequency of oscillation for three section RC phase shift network is given by _____
a) $1/(\pi\sqrt{6}\ RC)$
c) $1/(2\pi\sqrt{6}\ RC)$
b) $2/(\pi\sqrt{6}\ RC)$
d) $1/(2\sqrt{6}\ RC)$

29. Which of the following is not true for an RC phase shift oscillator?
a) Not Bulky
b) Less costly
c) Effective for oscillation less than 10KHz
d) Pure sine wave output is possible

30. The feedback factor for RC phase shift oscillator is _____
a) 1/18
c) 1/11
b) 1/29
d) 1/33

31. Recommended frequency range of Harley oscillator is _____
a) 30KHz-30MHz
c) 2Hz-3MHz
b) 1KHz-10MHz
d) 0.5KHz-40MHz

32. Lower frequencies are not practically possible in the case of Harley oscillator because of the requirement of low _____ value.
a) Capacitance
c) Inductance
b) Resistance
d) Gain

33. How many inductors are there in the tank circuit of Hartley oscillator?
a) 1
c) 3
b) 2
d) 0

34. The frequency of Hartley oscillator is expressed as _____
(Where L is effective inductance and C is the capacitance)
a) $1/(4\pi\sqrt{LC})$
c) $1/(3\pi\sqrt{LC})$
b) $1/(2\pi\sqrt{LC})$
d) $\sqrt{3}/(2\pi\sqrt{LC})$

35. How many capacitors are there in the tank circuit of Colpitts oscillator?
a) 1
c) 3
b) 2
d) 0

36. Which component of Colpitts oscillator is used in feedback system?
a) Inductor
c) Capacitor
b) Resistor
d) Transistor

37. Capacitive circuit configuration in Colpitts oscillator improves _____
a) Bulkiness
c) Impedance
b) Frequency stability
d) Appearance

38. If C1 and C2 are the capacitance used in Colpitts oscillator the effective capacitance in the equation of frequency calculation is equal to _____

a) (π×C1×C2)/(C1+C2)
c) (C1×C2)/(2π(C1+C2))
b) 3 (C1×C2)/(C1+C2)
d) (C1×C2)/(C1+C2)

39. Which configuration of transistor amplifier is used for Colpitts oscillator?

a) Common emitter amplifier
b) Common collector amplifier
c) Common base amplifier
d) Combination of both common emitter and common collector

40. Colpitts oscillator provides more performance than Hartley oscillator because of its _____ elements.

a) Capacitive
c) Inductive
b) Resistive
d) Active

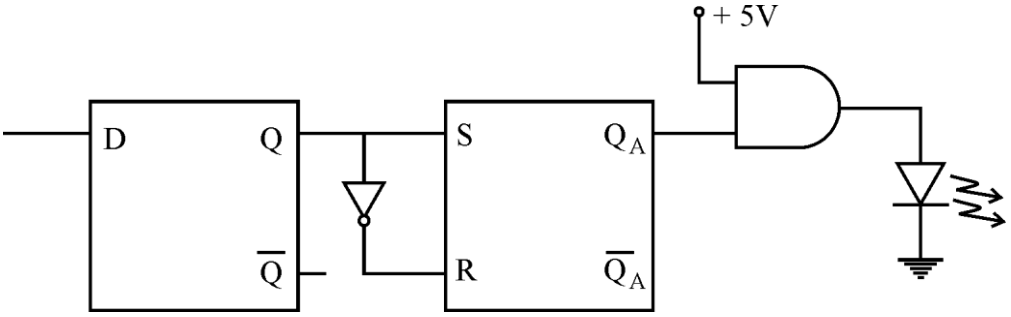
6. Digital Electronics

Position in Question Paper **Total Marks-10**

Q.1. f) 2-Marks
Q.2 d) 4-Marks
Q.5 c) 4-Marks

Descriptive Questions

1. Draw symbol and write truth table of EX-OR, Not, AND, OR, EX-NOR, NAND, NOR gate.
2. Implement the fundamental logic gates 'OR gate', 'AND gate', 'NOT gate' using only NAND gates and NOR gate.
3. Perform following number system conversion :
   (i) $(589)_{10}$ = ()$_2$
   (ii) $(101101)_2$ = ()$_{16}$
   (iii) $(413)_8$ = ()$_2$
   (iv) $(5AF)_{16}$ = ()$_{10}$
4. Refer the diagram shown in Fig. 4. What should be logic level at D input to make :
   i. LED ON
   ii. LED OFF
   iii. Justify your answer by giving step-by-step output of each stage.



5. Convert the following numbers :
   (i) $(456)_{10}$ = ( )$_2$
   (ii) $(5A)_{16}$ = ( )$_{10}$
   (iii) $(43)_8$ = ( )$_2$
   (iv) $(101011)_2$ = ( )$_{16}$

   (v) $(204)_{10}$ = ( )$_8$
   (vi) $(259)_{10}$ = ( )$_{16}$

6. Draw the symbol, logic expression and truth table of NOR gate.
7. Convert:
   (i) $(1101101)_2 = (\ ?\ )_8$
   (ii) $(513)_{10} = (\ ?\ )_2$
   (iii) $(125)_{10} = (\ ?\ )_{16}$
8. Define universal gate and implement NAND gate as a OR gate and EX-OR gate.
9. Define Demorgan's theorem first and write it's equation.
10. Draw symbol & truth table of D & T flip-flop
11. Explain working of JK flip flop
12. What is race around condition?
13. Explain RS flip flop.
14. Write any 4 Boolean laws.

MCQ Question

(Total number of Question=Marks*3=10*3=30)

Note: Correct answer is marked with **bold**

1. Which of the following is not a positional number system?
   a) Roman Number System
   c) Binary Number System
   b) Octal Number System
   d) Hexadecimal Number System
2. The value of radix in binary number system is _____
   a) 2
   c) 10
   b) 8
   d) 1
3. The binary equivalent of the decimal number 10 is _____
   a) 0010
   c) 1010
   b) 10
   d) 010
4. The octal equivalent of 1100101.001010 is _____
   a) 624.12
   c) 154.12
   b) 145.12
   d) 145.21
5. The input hexadecimal representation of 1110 is _____
   a) 0111
   c) 15
   b) E
   d) 14
6. Convert the binary equivalent 10101 to its decimal equivalent.
   a) 21
   c) 22
   b) 12
   d) 31
7. Which of the following is not a binary number?
   a) 1111
   c) 11E
   b) 101
   d) 000
8. Which of the following is the correct representation of a binary number?
   a) $(124)_2$
   c) $(110)^2$
   b) 1110
   d) $(000)_2$
9. Any signed negative binary number is recognised by its _____

a) MSB
b) LSB
c) Byte
d) Nibble

10. If the decimal number is a fraction then its binary equivalent is obtained by _____ the number continuously by 2.
a) Dividing
b) Multiplying
c) Adding
d) Subtracting

11. The representation of octal number (532.2)8 in decimal is _____
a) (346.25)10
b) (532.864)10
c) (340.67)10
d) (531.668)10

12. The decimal equivalent of the binary number (1011.011)2 is _____
a) (11.375)10
b) (10.123)10
c) (11.175)10
d) (9.23)10

13. An important drawback of binary system is _____
a) It requires very large string of 1's and 0's to represent a decimal number
b) It requires sparingly small string of 1's and 0's to represent a decimal number
c) It requires large string of 1's and small string of 0's to represent a decimal number
d) It requires small string of 1's and large string of 0's to represent a decimal number

14. The largest two digit hexadecimal number is _____
a) (FE)16
c) (FF)16
b) (FD)16
d) (EF)16

15. n boolean algebra, the OR operation is performed by which properties?
a) Associative properties
b) Commutative properties
c) Distributive properties
d) All of the Mentioned

16. According to boolean law: A + 1 = ?
a) 1
b) A
c) 0
d) A'

17. The involution of A is equal to _____
a) A
b) A'
c) 1
d) 0

18. A(A + B) = ?
a) AB
b) 1
c) (1 + AB)
d) A

19. DeMorgan's theorem states that _____
a) (AB)' = A' + B'
b) (A + B)' = A' * B
c) A' + B' = A'B'
d) (AB)' = A' + B

20. (A + B)(A' * B') = ?
a) 1
b) 0
c) AB
d) AB'

21. The boolean function A + BC is a reduced form of _____
a) AB + BC
b) (A + B)(A + C)
c) A'B + AB'C
d) (A + C)B

22. The output of a logic gate is 1 when all the input are at logic 0 as shown below:

INPUT		OUTPUT
A	B	C
0	0	1
0	1	0
1	0	0
1	1	0

INPUT		OUTPUT
A	B	C
0	0	1
0	1	0
1	0	0
1	1	1

The gate is either _____

a) A NAND or an EX-OR
b) An OR or an EX-NOR
c) An AND or an EX-OR
d) A NOR or an EX-NOR

23. How many AND gates are required to realize Y = CD + EF + G?

a) 4
b) 5
c) 3
d) 2

24. The NOR gate output will be high if the two inputs are _____

a) 00
b) 01
c) 10
d) 11

25. A universal logic gate is one which can be used to generate any logic function. Which of the following is a universal logic gate?

a) OR
b) AND
c) XOR
d) NAND

26. Which of the following are known as universal gates?

a) NAND & NOR
b) AND & OR
c) XOR & OR
d) EX-NOR & XOR

27. The truth table for an S-R flip-flop has how many VALID entries?
a) 1
c) 3
b) 2
d) 4

28. When both inputs of a J-K flip-flop cycle, the output will _____
a) Be invalid
c) Not change
b) Change
d) Toggle

29. A basic S-R flip-flop can be constructed by cross-coupling of which basic logic gates?
a) AND or OR gates
c) NOR or NAND gates
b) XOR or XNOR gates
d) AND or NOR gates

30. Tthe logic circuits whose outputs at any instant of time depends only on the present input but also on the past outputs are called _____
a) Combinational circuits
c) Latches
b) Sequential circuits
d) Flip-flops

31. The sequential circuit is also called _____
a) Flip-flop
c) Strobe
b) Latch
d) Adder

32. In S-R flip-flop, if Q = 0 the output is said to be _____
a) Set
c) Previous state
b) Reset
d) Current state