Subject:- Basic Electronics (22216)

SYLLABUS

Chapter No.	Name of Unit	Marks With Option
1	Semiconductor diodes	20
2	Applications of diode	24
3	Bipolar Junction Transistor	26
4	Field effect Transistor	18
5	Regulators and Power Supply	14
	Total Marks :-	**102**

BOARD THEORY

PAPER PATTERN

FOR BEL (22216)

Q.1		**Attempt any FIVE**	**5*2=10**
	a)	Semiconductor diodes	
	b)	Field effect Transistor	
	c)	Bipolar Junction Transistor	
	d)	Field effect Transistor	
	e)	Bipolar Junction Transistor	
	f)	Regulators and Power Supply	
	g)	Semiconductor diodes	
Q.2		**Attempt any THREE**	**3*4=12**
	a)	Semiconductor diodes	
	b)	Bipolar Junction Transistor	
	c)	Regulators and Power Supply	
	d)	Bipolar Junction Transistor	
Q.3		**Attempt any THREE**	**3*4=12**
	a)	Applications of diode	

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	b)	Applications of diode	
	c)	Field effect Transistor	
	d)	Regulators and Power Supply	
Q.4		**Attempt any FOUR**	**3*4=12**
	a)	Applications of diode	
	b)	Bipolar Junction Transistor	
	c)	Bipolar Junction Transistor	
	d)	Field effect Transistor	
	e)	Regulators and Power Supply	
Q.5		**Attempt any TWO**	**2*6=12**
	a)	Field effect Transistor	
	b)	Applications of diode	
	c)	Semiconductor diodes	
Q.6		**Attempt any TWO**	**2*6=12**
	a)	Semiconductor diodes	
	b)	Applications of diode	
	c)	Bipolar Junction Transistor	

CLASS TEST - I

PAPER PATTERN

COURSE: - Basic Electronics (22216)
PROGRAMME: - E&TC Engineering

Syllabus :-

Unit No.	Name of the Unit	Course Outcome (CO)
1	Semiconductor diodes	CO-216.1
2	Applications of diode	CO-216.2
3	Bipolar Junction Transistor	CO-216.3

		Course Outcome (CO)
Q.1	**Attempt any FOUR4*2=8Marks**	
a)	Semiconductor diodes	CO-216.1
b)	Applications of diode	CO-216.2
c)	Applications of diode	CO-216.2
d)	Bipolar Junction Transistor	CO-320.3
e)	Bipolar Junction Transistor	CO-216.3
f)	Semiconductor diodes	CO-216.1
Q.2	**Attempt any THREE3*4=12 Marks**	
a)	Semiconductor diodes	CO-216.1
b)	Applications of diode	CO-216.2
c)	Bipolar Junction Transistor	CO-216.3
d)	Applications of diode	CO-216.2
e)	Applications of diode	CO-216.2
f)	Bipolar Junction Transistor	CO-216.3

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CLASS TEST - II

PAPER PATTERN

COURSE: - Basic Electronics (22216)
PROGRAMME: - E&TC Engineering

Syllabus :-

Unit	Name of the Unit	Course Outcome(CO)
3	Bipolar Junction Transistor	CO-216.3
4	Field effect Transistor	CO-216.4
5	Regulators and Power Supply	CO-216.5

Q.1	Attempt any FOUR 4*2=8Marks	Course Outcome (CO)
a)	Bipolar Junction Transistor	CO-216.3
b)	Field effect Transistor	CO-216.4
c)	Bipolar Junction Transistor	CO-216.3
d)	Field effect Transistor	CO-216.4
e)	Regulators and Power Supply	CO-216.5
f)	Regulators and Power Supply	CO-216.5
Q.2	Attempt any THREE 3*4=12 Marks	
a)	Bipolar Junction Transistor	CO-216.3
b)	Field effect Transistor	CO-216.4
c)	Field effect Transistor	CO-216.4
d)	Regulators and Power Supply	CO-216.5
e)	Bipolar Junction Transistor	CO-216.3
f)	Bipolar Junction Transistor	CO-216.3

COURSE OUTCOME
(CO)

COURSE: - Basic Electronics (22216)

PROGRAMME: - E&TC Engineering

CO.NO	Course Outcome
CO-216.1	Use relevant diode in different electronics circuits.
CO-216.2	Maintain rectifiers comprising of diodes.
CO-216.3	Use BJT in electronics circuits.
CO-216.4	Use FET in electronics circuits.
CO-216.5	Maintain DC regulated power supply.

1. Semiconductor diode

Position in Question Paper   **Total Marks-20**

Q.1. a) 2-Marks.

Q.1. g) 2-Marks.

Q.2. a) 4-Marks.

Q.5. c) 6-Marks.

Q.6. a) 6-Marks.

Descriptive Question

1. Explain the forward and reverse bias characteristics of PN junction diode?

2. Write the diode equation and discuss the effect of temperature on diode current?

3. The current flowing in a silicon PN diode at room temperature is 10 μA, when the large reverse bias is applied. Calculate the current flowing when 0.2v forward bias is applied?

4. Calculate the factor by which the current will increase in silicon diode operating at 5M a forward voltage of 0.4V when the temperature is raised from 25ºC to150ºC?

5. Describe the principle of operation of and V-I characteristics of

a) Photo diode

b) LED

6. Describe the V-I characteristics of P-N Junction diode?

7. Differentiate between tunnel diode and normal PN junction diode?

8. Derive the expression for dynamic resistance of PN diode?

9. With simple circuit explains how the zener diode acts as a voltage regulator

10. Write short notes on LED Sketch and explain the volt-ampere characteristics of a Zener diode.

11. Draw band diagram of PN junction under open circuit conditions and explain?

12. What are the general specifications of PN junction diode?

13. With neat sketch explain principle and operation of Zener diode?

14. What are the basic applications of conventional diode and zener diode?

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MCQ Questions:-

(Total number of Question=Marks*3=14*3=42)

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

1. Why is there a sudden increase in current in Zener diode?
   a) Due to the rupture of ionic bonds
   b) Due to covalent bonds
   c) Due to viscosity
   d) Due to potential difference

2. What is the semiconductor diode used as?
   a) Oscillator
   b) Amplifier
   c) Rectifier
   d) Modulator

3. What is a Zener diode used as?
   a) Oscillator
   b) Regulator
   c) Rectifier
   d) Filter

4. When a junction diode is reverse biased, what causes current across the junction?
   a) Diffusion of charges
   b) Nature of material
   c) Drift of charges
   d) Both drift and diffusion of charges

5. What can a p-n junction diode be used as?
   a) Condenser
   b) Regulator
   c) Amplifier
   d) Rectifier

6. Current carrier in conductors is_
   a) Electron
   b) Proton
   c) Neutron
   d) Positron

7. Which group among the following is insulator?
   a) Silver, copper, gold
   b) Paper, glass, cotton
   c) The human body, wood, iron
   d) Glass, copper, paper

8. The band gap bet the valence band and conduction band is the measure of _
   a) The conductivity of material
   b) The resistivity of material
   c) Charge density
   d) Ease of ionization

9. The rubber used in the wheels of aero-plane is _____
   a) Perfect insulator
   b) Slightly conducting
   c) Can be an insulator or conducting
   d) Semiconductor

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10. Insulation breakdown may occur at _____

  a) High temperature   c) At any temperature

  b) Low temperature   d) Depends on pressure

11. Superconductors have _____

  a) Almost zero resistivity   c) Temperature-dependent resistivity

  b) Very high resistivity   d) Moderate value of resistivity

12. An intrinsic semiconductor, at the absolute zero temperature, behaves
    like which one of the following?

  a) Insulator   c) n-type semiconductor

  b) Superconductor   d) p-type semiconductor

13. Increases exponentially with the increasing bandgap

  a) Is independent of the temperature and the bandgap

  b) Decreases exponentially with the increasing bandgap

  c) Decreases with increasing temperature

  d) None

14. Which of the following statements is not true?

  a) The resistance of intrinsic semiconductor decreases with the increase of temp.

  b) Doping pure Si with trivalent impurities gives p-type semiconductors

  c) The majority carriers in n-type semiconductors are holes

  d) A p-n junction can act as a semiconductor diode

15. Holes are charge carriers in which one of the following?

  a) Intrinsic semiconductors   c) n-type semiconductors

  b) Ionic solids   d) Metals

16. In semiconductors at a room temperature correspond to which among the follo?

  a) The valence band is partially empty and the conduction band is partially filled

  b) The valence band is filled and the conduction band is partially filled

  c) The valence band is filled

  d) The conduction band is empty

17. At absolute zero, Si acts as which of the following?

  a) Non-metal   **c) Insulator**

  b) Metal   d) Capacitor

19. Choose the false statement from the following.

   a) In conductors the valence and conduction band overlap

   b) Substances with an energy gap of the order of 10 eV are insulators

   c) The resistivity of a semiconductor increases with increase in temperature

   d) The conductivity of a semiconductor increases with increase in temperatur

20. At which temperature, a pure semiconductor behaves slightly as a conductor?

   a) Low temperature   **c) High temperature**

   b) Room temperature   d) Vacuum

21. In a pure semiconductor crystal, if current flows due to breakage of crystal bonds, then what is the semiconductor called?

   a) Acceptor   **c) Intrinsic semiconductor**

   b) Donor   d) Extrinsic semiconductor

22. How many junction/s do a diode consist?

   a) 0   c) 2

   b) 1   d) 3

23. If the positive terminal of the battery is connected to the anode of the diode, then it is known as

   a) Forward biased   c) Equilibrium

   b) Reverse biased   d) Schottky barrier

24. During reverse bias, a small current develops known as

   a) Forward current   **c) Reverse saturation current**

   b) Reverse current   d) Active current

25. If the voltage of the potential barrier is V0. A voltage V is applied to the input, at what moment will the barrier disappear?

   a) $V < V0$ c) $V > V0$

   b) $V = V0$ d) $V << V0$

26. What is the maximum electric field when Vbi=2V , VR=5V and width of the semiconductor is 7cm?

   a) -100V/m   c) 100V/m

   b) -200V/m   d) 200V/m

27. When the diode is reverse biased with a voltage of 6V and Vbi=0.63V. potential?

   a) 6V   c) 5.27V

   b) 6.63V   d) 0.63V

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28. Zener diodes are also known as

a) Voltage regulators   c) Breakdown diode

b) Forward bias diode   d) None of the mentioned

29. Which of the following is true about the resistance of a Zener diode?

a) It has an incremental resistance

b) It has dynamic resistance

c) The value of the resistance is the inverse of the i-v char of the Zener diode

d) All of the mentioned

30. Which of the following is true about the temp coef of the Zener diode?

a) For Zener voltage less than 5V, TC is negative

b) For Zener voltage around 5V, TC can be made zero

c) For higher values of Zener voltage, TC is positive

d) All of the mentioned

31. Which of the following can be used in series with a Zener diode so that comb. has almost zero temperature coefficient?

a) Diode   c) Transistor

b) Resistor   d) MOSFET

32. In Zener diode, for currents greater than the knee current, the v-i curve is almost

a) Almost a straight line parallel to y-axis

b) Almost a straight line parallel to x-axis

c) Equally inclined to both the axes with a positive slope

d) Equally inclined to both the axes with a negative slope

33. Zener diodes can be effectively used in voltage regulator. However, they are these days being replaced by more efficient

a) Operational Amplifier   **c) Integrated Circuits**

b) MOSFET   d) None of the mentioned

34. What is the forbidden gap voltage for silicon material?

a) 1.46 V   c) 10 V

b) 1.56 V   **d) 1.21 V**

35. Which of the following parameters of P-N junction diode increases with temp.

a) Cut in voltage   c) Ideality factor

b) Reverse saturation current.   d) Resistance

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36. Which of these P-N junction characteristics are not dependent on temperature.

   a) Junction resistance   c) Bias current

   b) Reverse saturation current   d) Barrier voltage

37. As the temperature to the P-N junction increases the current increases due to?

   a) Leakage in bias region   c) Leakage in P region

   b) Electron-hole pair   d) Leakage in N region

38. By what percentage the reverse saturation current increases with 10 C rise in the temp.

   a) 25%   c) 50%

   b) 12.5%   **d) 7%**

39. What will be the decrease of barrier voltage with the rise in 10C in temperature?

   a) 10V   c) 10mV

   b) 1mV   **d) 2mV**

40. What will be the reverse saturation current in the junction when the voltage across the junction is 0?

   a) 0.3A   **c) 0A**

   b) 0.7A   d) 1.24A

41. The breakdown voltage of the P-N junction diode decreases due to the increase in.

   a) Reverse saturation current   c) Bias voltage

   b) Reverse leakage current   d) Barrier voltage

42. A diode is__

   a) Is the simplest of the semiconductor devices

   b) Has a characteristic that closely follows that of a switch

   c) Is two terminal device

   d) All of the mentioned

2. Applications of diodes

Position in Question Paper   **Total Marks-24**

Q.3. a) 4-Marks.

Q.3. b) 4-Marks.

Q.4. a) 4-Marks.

Q.5. b) 6-Marks.

Q.6. b) 6-Marks.

Descriptive Question

1. Describe the operation of Half Wave Rectifier with and with out filters?

2. Derive efficiency and Ripple Factor of half wave rectifier?

3. With neat diagram explain Capacitor input filter and derive its ripple factor.

4. Discuss working of Bridge rectifier & derive its Ripple factor and efficiency?

5. Explain the operation of CLC filter and derive its ripple factor?

6. Explain the operation of inductor input filter with Fullwave Rectifier?

7. Describe the operation of center tapped full wave rectifier along with i/0 w/f?

8. Compare Half Wave Rectifier, Full Wave Rectifier and Bridge rectifier?

9. Explain working of π Section filter and derive the expression for ripple factor?

10. Describe about Multiple π-section filters?

11. Explain Multiple L-section filter with neat sketch and derive its ripple factor?

12. Draw the circuit diagram of FWR with inductor filter and explain its operation

13. Compare various filter circuits in terms of its ripple factors.

14. Define ripple factor. What is meant by Peak Inverse Voltage?

MCQ Question

(Total number of Question=Marks*3=16*3=48)

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

1. Which of the following isn't a type of rectifier?
   a) Precision Half-wave Rectifier   c) Peak Rectifier
   b) Bridge 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. Find V– when VI is -1V.
   a) 0V   c) 1V
   b) 0.7V   d) 1.7V

5. Find V0 when VI is 2V.
   a) 0V   c) 1V
   b) 0.7V   d) 1.7V

6. DC average current of a half wave rectifier output is _____
   (Where Im is the maximum peak current of input)
   a) $2I_m/\pi$ c) $I_m/2\pi$
   b) I_m/π   d) $1.414I_m/\pi$

7. DC power output of half wave rectifier is equal to _____
   (Im is the peak current and RL is the load resistance)
   a) $(2I_m^2/\pi^2)R_L$ **c) $(I_m^2/\pi^2)R_L$**
   b) $(I_m^2/2\pi^2)R_L$ d) $(4I_m^2/\pi^2)R_L$

8. Ripple factor of half wave rectifier is _____
   a) 1.414   c) 1.3
   b) 1.21   d) 0.48

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9. If input frequency is 50Hz then ripple frequency of HWR will be equal to _

   a) 100Hz   c) 25Hz

   b) 50Hz   d) 500Hz

10. Transformer utilization factor of a half wave rectifier is equal to _____

   a) 0.267   c) 0.297

   b) 0.287   d) 0.256

11. If peak voltage on a half wave rectifier circuit is 5V and diode cut-in voltage is
    0.7, then peak inverse voltage on diode will be _____

   a) 3.6V   **c) 5V**

   b) 4.3V   d) 5.7V

12. Efficiency of half wave rectifier is _____

   a) 50%   **c) 40.6%**

   b) 81.2%   d) 45.3%

13. In a half wave rectifier, the input sine wave is 200sin100 πt Volts.
    The average output voltage is _____

   a) 57.456V   c) 75.235V

   b) 60.548V   **d) 63.661V**

14. In a half wave rectifier, the input sine wave is 200sin200 πt Volts. If load
    resistance is of 1k then the average DC power output of half wave rectifier is _____

   a) 3.25W   c) 5.02W

   b) 4.05W   d) 6.25W

15. In a half wave rectifier, the input sine wave is 250sin100 πt Volts.
    The output ripple frequency of rectifier will be _____

   a) 100Hz   **c) 50Hz**

   b) 200Hz   d) 25Hz

16. DC average current of a center taped full wave rectifier is _____
    (Where Im is the maximum peak current of input)

   a) 2Im/π   c) Im/2π

   b) Im/π   d) 1.414Im/π

17. DC power output of center tapped full wave rectifier is equal to _____
    (Im is the peak current and RL is the load resistance)

   a) (2Im2/π2)RL   c) (Im2/π2)RL

   b) (Im2/2 π2)RL   **d) (4Im2/π2)RL**

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18. Ripple factor of center tapped full wave rectifier is __

   a) 1.414   c) 1.3

   b) 1.21   **d) 0.48**

19. If input frequency is 50Hz then ripple frequency of center tapped FWR will be_

   a) 100Hz   c) 25Hz

   b) 50Hz   d) 500Hz

20. Transformer utilization factor of a center tapped full wave rectifier is_

   a) 0.623   **c) 0.693**

   b) 0.678   d) 0.625

21. If peak voltage on a center tapped full wave rectifier circuit is 5V and diode cut-in voltage is 0.7, then peak inverse voltage on diode will be _

   a) 4.3 V   c) 5.7 V

   b) 10 V   d) 9.3 V

22. Efficiency of center tapped full wave rectifier is ___

   a) 50%   c) 40.6%

   b) 81.2%   d) 45.3%

23. In a center tapped full wave rectifier, the input sine wave is 20sin500 πt. The average output voltage is ___

   a) 12.73V   c) 11.62V

   b) 6.93V   d) 3.23V

24. In a center tapped full wave rectifier, the input sine wave is 200sin50 πt. If load resistance is of 1k then average DC power output of half wave rectifier is _

   a) 12.56W   c) 4.02W

   b) 16.20W   d) 8.04W

25. In a center tapped full wave rectifier, the input sine wave is 250sin100 πt. The output ripple frequency of rectifier will be __

   a) 50Hz   **c) 100Hz**

   b) 200Hz   d) 25Hz

26. DC average current of a bridge full wave rectifier is _ (Where Im is the maximum peak current of input)

   a) 2Im/π   c) Im/2π

   b) Im/π   d) 1.414Im/π

27. DC power output of bridge full wave rectifier is equal to _____

   (Im is the peak current and RL is the load resistance)

   a) $(2I_m^2/\pi^2)R_L$ c) $(I_m^2/\pi^2)R_L$

   b) $(4I_m^2/\pi^2)R_L$ d) $(I_m^2/2\pi^2)R_L$

28. Ripple factor of bridge full wave rectifier is _____

   a) 1.414   **c) 0.482**

   b) 1.212   d) 1.321

29. If input frequency is 50Hz then ripple frequency of bridge FWR will be_

   a) 200Hz   c) 45Hz

   b) 50Hz   **d) 100Hz**

30. Transformer utilization factor of a bridge full wave rectifier is equal to ___

   a) 0.62   **c) 0.81**

   b) 0.69   d) 0.43

31. If peak voltage on a bridge full wave rectifier circuit is 5V and diode
   cut-in voltage is 0.7, then peak inverse voltage on diode will be _____

   a) 4.3V   c) 10V

   b) 5.7V   **d) 5V**

32. Efficiency of bridge full wave rectifier is _____

   a) 81.2%   c) 40.6%

   b) 50%   d) 45.3%

33. In an bridge FWR, the input sine wave is 40sin100 πt. The average output voltage is

   a) 22.73V   **c) 25.47V**

   b) 16.93V   d) 33.23V

34. Number of diodes used in a full wave bridge rectifier is _____

   a) 1   **c) 4**

   b) 2   d) 6

35. In a bridge FWR, the i/p sine is 250sin100 πt. The o/p ripple frequency of rectifier will be _

   a) 50Hz   **c) 100Hz**

   b) 200Hz   d) 25Hz

36. Calculate LC for a full wave rectifier which provides 10V dc at 100mA with a
   maximum ripple of 2%. Input ac frequency is 50Hz.

   a) 40*10-6   c) 30*10-6

   b) 10*10-6   d) 90*10-6

37. 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

38. The condition for the regulation curve in a choke filter is___

   a) $LC \geq RL/3\omega$ c) $L \geq RL/3\omega$

   b) $LC \leq RL/3\omega$ d) $LC \geq RL3\omega$

39. The ripple factor for an l section filter is_____

   a) $\Upsilon = 1/6\sqrt{2}\omega 2LC$ c) $\Upsilon = 6\sqrt{3}\omega 2LC$

   b) $\Upsilon = 6\sqrt{2}\omega 2LC$ d) $\Upsilon = 1/6\sqrt{3}\omega 2LC$

40. The output dc voltage of an LC filter is_____

   a) $VDC = 2Vm/\pi + IDCR$ c) $VDC = 2Vm/\pi - 2IDCR$

   b) $VDC = Vm/\pi - IDCR$ **d) $VDC = 2Vm/\pi - IDCR$**

41. The rms value of ripple current for an L section filter is_____

   a) $IRMS = \sqrt{2}/3 * XL * VDC$ c) $IRMS = \sqrt{2}/3 * XL * VDC$

   b) $IRMS = \sqrt{2}/3 * XL * VDC$ d) $IRMS = \sqrt{2}/3 * XL * VDC$

42. What makes the load in a choke filter to bypass harmonic components?

   a) capacitor   c) resistor

   b) inductor   d) diodes

43. The ripple to heavy loads by a capacitor is_____

   a) high   **c) low**

   b) depends on temperature   d) no ripple at all

44. In a choke l section filter_____

   a) the inductor and capacitor are connected across the load

   b) the inductor is connected in series and capacitor is connected across the load

   c) the inductor is connected across and capacitor is connected in series to the load

   d) the inductor and capacitor are connected in series

45. What is the number of capacitors and inductors used in a CLC filter?

   a) 1, 2 respectively   c) 1, 1 respectively

   b) 2, 1 respectively   d) 2, 2 respectively

46. 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

47. At f=50Hz, the ripple factor of CLC filter is_____

a) ϒ=5700RL / (LC1C2)   c) ϒ=5700LC1/ (C2RL)

b) ϒ=5700/ (LC1C2RL)   d) ϒ=5700C1C2/ (LRL)

48. A single phase full wave rectifier makes use of pi section filter with 10µF capacitors and a choke of 10henry. The secondary voltage is 280V, current is 100amp Vdc ?

a) 345V   c) 243V

b) 521V   **d) 346V**

3. Bipolar Junction Transistors

Position in Question Paper   **Total Marks-26**

Q.1. c) 2-Marks.

Q.1. e) 2-Marks.

Q.2. b) 4-Marks.

Q.2. d) 4-Marks.

Q.4. b) 4-Marks.

Q.4. c) 4-Marks

Q.6. c) 6-Marks

Descriptive Question

1. With reference to a BJT, explain the following terms in detail?

  a) Emitter Efficiency 4M

  b) Base Transportation Factor 3M

  c) Large signal current gain. 3M

2. Write the current components of PNP transistor and explain.

3. For a transistor the leakage current is 0.1µA in CB configuration, while it is 19ma when it is connected in CE configuration. Calculate α & β of the same transistor?

4. What is early effect? How does it modify the VI characteristics of a BJT? 5M

5. Describe the operation of a PNP BJT in common collector configuration? 5M

6. Draw the common collector transistor characteristics? 5M

7. With a neat diagram explain how a transistor acts as an amplifier? 5M

8. Explain the characteristics of CE configuration?

9. Compare CB, CE and CC configurations of BJT

10. Why transistor is considered as current controlled device?

11. Define thermal instability, what are the factors affecting the stability factor?

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12. How self-bias circuit will eliminate the drawbacks in fixed bias circuit ?

13. Discuss the criteria of fixed operating point?

14. What is thermal runaway? What is the condition for thermal stability in CE configuration?

15.Derive the stability factor S in fixed bias circuit? What are the drawbacks of transistor fixed bias circuit?

16.Differentiate the bias stabilization and compensation techniques?6

17.Mention the merits and demerits of collector to base feedback bias.

18. Differentiate between thermistor and sensistor compensation techniques?

19. What do you understand by DC & AC load line?

20. Define operating point Q of transistor.

21. Define stability factor S, S', S''.

22. What are the compensation techniques used for bias stability?

23.What is thermal runaway and thermal stability?

MCQ Questions:-

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

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

1. Which of the following is not a part of a BJT?

   a) Base

   b) Collector

   c) Emitter

   d) None of the mentioned

2. The number of pn junctions in a BJT is/are

   a) 1

   b) 2

   c) 3

   d) 4

3. 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

4. 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

5. 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

6. In cut off mode

   a) The base-emitter junction is F.B and emitter-collector junction isR.B

   b) The base-emitter junction is F.B and emitter-collector junction isF.B

   c) The base-emitter junction is R.B and emitter-collector junction is R.B

   d) The base-emitter junction R.B and emitter-collector junction is F.B

7. On which of the following does the scale current not depends upon?

   a) Effective width of the base

   b) Charge of an electron

   c) Electron diffusivity

   d) Volume of the base-emitter junction

8. On which of the following does the collector current not depends upon?

   a) Saturation current

   b) Thermal voltage

   c) Voltage difference between the base and emitter

   d) None of the mentioned

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9. The range for the transistor parameter also referred as common-emitter current gain has a value of_____ for common devices.
   a) 50-200   c) 750-1000
   b) 400-600   d) > 1000

10. The collector current Ic is related to the emitter current Ie by a factor k. If b is the transistor parameter then the value of k in terms of b is
   a) k = b/(b + 1)   c) b = (k + 1)/k
   b) k = (b + 1)/b   d) None of the mentioned

11. The curve between the collector current versus the potential difference between the base and emitter is
   a) A straight line inclined to the axes   **c) An exponentially varying curve**
   b) A straight line parallel to the x-axis   d) A parabolic curve

12. The curve between the collector current and the saturation is
   a) A straight line inclined to the axes   c) A straight line parallel to y-axis
   b) A straight line parallel to the x-axis   d) An exponential curve

13. The magnitude of the thermal voltage is given by
   a) k/Tq   c) q/Kt
   b) kT/q   d) Tk/q

14. The correct relation between the transistor parameters α and ß are related by
   a) ß = 1 − α/α   c) α = ß + 1/ß
   b) ß = 1 + α/α   **d) α = ß/ß + 1**

15. The correct expression relating the emitter current Ie to the collector current Ic is
   a) Ie = α Ic   c) Ie = ß Ic
   b) Ic = α Ic   d) Ic = ß Ic

16. The value of the thermal voltage at room temperature can be approximated as
   a) 25 mV   c) 35 mV
   b) 30 mV   d) 40 mV

17. The correct relation between the emitter current Ie and the base current Ib is given by
   a) Ib = (1 + α) Ie   c) Ie = (1 − ß) Ib
   b) Ib = (α − 1) Ie   **d) Ie = (1 + ß) Ib**

18. The Early Effect is also called as
   a) Base-width modulation effect   c) Both of the mentioned
   b) Base-width amplification effect   d) None of the mentioned

19. For the BJT to operate in active mode Collector-Base junction must be

   a) Heavily doped

   b) Must reversed bias

   c) Must be forward bias

   d) Lightly doped

20. Collector current (Ic) reaches zero when

   a) Vce = Vt ln (Isc/I)

   b) Vt = Vce ln (Isc/I)

   c) Vce = Vt ln (I/Isc)

   d) Vce = Vt ln (Isc + I/I)

21. 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

22. The potential difference between the base and the collector Vcb in a pnp transistor in saturation region is _____

   a) -0.2 V

   b) -0.5V

   c) 0.2 V

   d) 0.5 V

23. For a pnp transistor in the active region the value of Vce is

   a) Less than 0.3V

   b) Less than 3V

   c) Greater than 0.3V

   d) Greater than 3V

24. 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

25. 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

26. Find the value of R(E) to establish a dc emitter current of about 0.5 mA.

   a) 28.57 kΩ

   b) 57.04 kΩ

   c) 114.08 kΩ

   d) 228.16 kΩ

27. Find R(C) to establish a dc collector voltage of about +5V.

   a) 5 kΩ

   b) 10 kΩ

   c) 15 kΩ

   d) 20 kΩ

28. For R (L) = 10 kΩ and transistor Ro = 200 kΩ, determine the overall voltage gain.

a) -21 V/V   **c) -86 V/V**

b) -42 V/V   d) -123 V/V

29. The advantages over the vacuum triode for a junction transistor is_____

a) high power consumption   c) large size

b) high efficiency   d) less doping

30. What is the left hand section of a junction transistor called?

a) base   **c) emitter**

b) collector   d) depletion region

31. In an NPN transistor, the arrow is pointed towards_____

a) the collector   c) depends on the configuration

b) the base   **d) the emitter**

32. Which of the following is true in construction of a transistor?

a) the collector dissipates lesser power

b) the emitter supplies minority carriers

c) the collector is made physically larger than the emitter region

d) the collector collects minority charge carriers

33. In the operation of an NPN transistor, the electrons cross which region?

a) emitter region   c) the region where there is low depletion

b) the region where high depletion   **d) P type base region**

34. Which of the following are true for a PNP transistor?

a) the emitter current is less than the collector current

b) the collector current is less than the emitter current

c) the electrons are majority charge carriers

d) the holes are the minority charge carriers

35. In the saturated region, the transistor acts like a_____

a) poor transistor   c) open switch

b) amplifier   **d) closed switch**

36. When does the transistor act like an open switch?

a) cut off region   c) saturated region

b) inverted region   d) active region

37. If the emitter-base junction is forward biased and the collector-base

junction is reverse biased, what will be the region of operation for a transistor?

a) cut off region

c) inverted region

b) saturated region

d) active region

38. The transfer of a signal in a transistor is_____

a) low to high resistance

c)collector to base junction

b) high to low resistance

d) emitter to base junction

39. The input resistance is given by _____

a) $\Delta VCE/\Delta IB$

c) $\Delta VBE/\Delta IC$

b) $\Delta VBE/\Delta IB$

d) $\Delta VBE/\Delta IE$

40. The output resistance is given by _____

a) $\Delta VCE/\Delta IB$

c) $\Delta VBE/\Delta IC$

b) $\Delta VBE/\Delta IB$

d) $\Delta VCE/\Delta IC$

41. Which of the following cases damage the transistor?

a) when VCE is increased too far

c) when VBE is increased too far

b) when VCE is decreased too far

d) when VBE is decreased too far

42. When the collector junction is reverse biased and emitter junction is forward biased,

the operating region of the transistor is called_____

a) inverted region

c) cut off region

b) active region

d) cut in region

43. The small amount of current which flows even when base current IB=0 is called__

a) IBEO

c) ICEO

b) ICBO

d) IC

44. A change in 700mV in base emitter voltage causes a change of 200μA in

base current. Determine the dynamic input resistance.

a) 2kΩ

c) 3kΩ

b) 10kΩ

d) 3.5kΩ

45. The change in collector emitter voltage from 6V to 9V causes increase in collector

current from 6mA to 6.3mA. Determine the dynamic output resistance.

a) 20kΩ

c) 50kΩ

b) 10kΩ

d) 60kΩ

46. Which of the following points locates the quiescent point?

a) (IC, VCB)

c) (IE, VCB)

b) (IE, VCE)

d) (IC, VCE)

47. The collector current (IC) that is obtained in a self-biased transistor is_____

  a) (VTH – VBE)/RE   c) (VTH – VBE)/RE

  b) (VTH + VBE)/RE   d) (VTH + VBE)/RE

48. The collector to emitter voltage (VCE) is obtained by_____

  a) VCC – RCIC+RBIB   c) VCC + RCIC

  b) VCC – RCIC-REIE   d) VCC + RCIB

49. The thermal runway is avoided in a self-bias because_____

  a) of its independence of β

  b) of the positive feedback produced by the emitter resistor

  c) of the negative feedback produced by the emitter resistor

  d) of its dependence of β

50. When the temp is increased, what happens to the Ic after a feedback is given?

  a) it remains same   **c) it cannot be predicted**

  b) it increases   d) it decreases

51. The stability factor for a self-biased transistor is_____

  a) 1 – RTH/RE   c) 1 + RE/RTH

  b) 1 + RTH/RE   d) 1 – RE/RTH

52. Where should be the bias point set in order to make transistor work as an amplifier?

  a) Cut off   c) Saturation

  b) Active   d) Cut off and Saturation

53. Q point can be set to work on active region requires particular conditions?

  a) BE reverse biased and BC forward biased

  b) BE reverse biased and BC reverse biased

  c) BE forward biased and BC reverse biased

  d) BE forward biased and BC forward biased

54. The Q-point of a transistor is made to shift between Active and cut off Region, then how does the transistor behave?

  a) Switch   c) Inverter

  b) Amplifier   d) Bulb

4. Field effect Transistors.

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

Q.1. b) 2-Marks.
Q.1. d) 2-Marks.
Q.3. c) 4-Marks.
Q.4. d) 4-Marks.
Q.5. a) 6-Marks

Descriptive Questions

1. Detail the construction of an n-channel MOSFET of depletion type. Draw and explain its Characteristics?

2. Explain the construction and principle of operation of n-channel JFET.

3. Define the JFET Volt-Ampere Characteristics.

4. Draw and explain construction and operation of Enhancement mode MOSFET with its Characteristics?

5. Draw and explain construction and operation of Enhancement mode MOSFET with its Characteristics?

6. Draw the basic circuit and small signal model of Common drain FET amplifier.

7. Derive the expression for input and output impedance of common drain amplifier using FET?

8. Explain the small signal equivalent circuit of Common Gate amplifier.

9. Explain the construction of n channel JFET

10. Give classification of FET. Draw the symbol of each type.

MCQ Questions:-

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

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

1. Ideal maximum voltage for common drain amplifier is _____
   a) 0   c) 0.5
   b) 1   d) 2

2. If a certain drain JFET has a transconductance of 4ms. And has external drain resistance of 1.5 ohm than ideal voltage gain will be _____
   a) 4   **c) 6**
   b) 5   d) 8

3. Input resistance of common gate of the amplifier is _____
   a) zero   **c) extremely low**
   b) infinity   d) extremely high

4. A FET circuit has a transconductance of 2500 μ seconds and drain resistance equals to 10Kohms than voltage gain will be _____
   a) 20   c) 30
   b) 25   d) 35

5. Voltage gain of common drain amplifier is always slightly less than _____
   a) 0.5   c) 1.5
   b) 1   d) 2

6. A common gate amplifier has _____
   a) low input impedance   c) infinite input impedance
   b) high input impedance   d) no impedance

7. D-MOSFET in case of common source amplifier can operate with gate to source voltage zero at _____
   a) Peak positive point   **c) Q point**
   b) Peak negative point   d) Origin

8. A common source amplifier has _____
   a) no source resistance   c) no gate resistance
   b) no drain resistance   d) low input impedance

9. The drain of FET is analogous to BJT
   a) collector   c) base
   b) emitter   d) drain

10. Input signal of common drain amplifier is applied to the gate through _____

  a) input resistor   c) output capacitor

  b) coupling capacitor   d) transformer

11. For NMOS transistor which of the following is not true?

  a) The substrate is of p-type semiconductor

  b) Inversion layer or induced channel is of n type

  c) Threshold voltage is negative

  d) None of the mentioned

12. Process transconductance parameter is directly proportional to

  a) Electron mobility only   c) Oxide capacitance only

  b) (Electron mobility)-1 only   **d) Product of capacitance,electron mobility**

13. The SI Units of the Process transconductance Parameter (k') is

  a) V2/A   c) V/A

  b) A/V2   d) A/V

14. Aspect ratio of the MOSFET has the units of

  a) No units   c) m2

  b) m   d) m-1

15. The MOSFET transconductance parameter is the product of

  a) Process transconductance and inverse of aspect ratio

  b) Inverse of Process transconductance and aspect ratio

  c) Inverse of Process transconductance and inverse of aspect ratio

  d) Process transconductance and aspect ratio

16. If a MOSFET is to be used in the making of an amplifier then it work_

  a) Cut-off region   **c) Saturation region**

  b) Triode region   d) Both cut-off and triode region

17. For MOSFET is to be used as a switch then it must operate in

  a) Cut-off region   c) Saturation region

  b) Triode region   **d) Both cut-off and triode region**

18. In the saturation region of the MOSFET the saturation current is

  a) Independent of the voltage difference between the source and the drain

  b) Depends directly on the voltage difference between the source and the drain

  c) Depends directly on the overdriving voltage

  d) Depends directly on the voltage supplied to the gate terminal

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19. Which of the following is true for the saturation region?

  a) VDG ≤ |Vtp| c) VDG < |Vtp|

  b) VSD ≤| VOV| d) VSD <| VOV|

20. The current iD

  a) Depends linearly on VOV in the saturation region

  b) Depends on the square of VOV in the saturation region

  c) Depends inversely on VOV in the triode region

  d) None of the mentioned

21. In which of the following configuration does a MOSFET works as an amplifier?

  a) Common Source (CS)   c) Common drain (CD)

  b) Common Gate (CG)   **d) All of the mentioned**

22. Which is true for the value of Avo for common source (Represented by A1) and common source with a source resistance (represented by A2).

  a) A1 = A2   **c) A1 < A2**

  b) A1 > 2   d) |A1| < |A2|

23. In which of the following config is the Ri not equal to zero ideally?

  a) Common source configuration

  b) Common source configuration with source resistance

  c) Common gate configuration

  d) Source follower configuration

24. Which of the following has AVO independent of the circuit elements?

  a) Common source configuration   **c) Source follower configuration**

  b) Common gate configuration   d) None of the mentioned

25. An amplifier is designed using fixed bias configuration, what is its output impedance (source Resistor is bypassed)?

  a) RD+rd   **c) RD || rd**

  b) RG   d) 0

26. An amplifier is designed using fixed bias configuration, what is its input impedance

  a) RD+rd   c) RD || rd

  b) RG   d) 0

27. Which of the following is true about the common Source amplifier?

  a) It has low input impedance   c) Infinite gain

  b) It has high output impedance   **d) Phase reversal voltage output**

28. A Self bias config contains RD=3.3, Rs=1 KΩ, RG=1MΩ, gm=1.5mS. Av?
   a) -2
   c) -4
   b) 3
   d) 5

29. What is the reason for connecting a capacitor in parallel with Rs?
   a) It blocks the noise
   b) For ac signal it acts a short circuit resulting in grounding source terminal
   c) It blocks the noise resulting in grounding source terminal
   d) To increase impedance

30. A sinusoidal signal has 1.5V at t=2S, If this signal is given to Common source amplifier with |Av|=5V, what will be its output at t=2S?
   a) 7.5V
   c) 0
   b) -7.5V
   d) 15V

31. For a self bias amplifier, RS=RD, the output will be_____
   a) Same as Input
   c) 0
   b) Same as i/p but phase reversed
   d) Infinite

32. Which of the following statement is true about FET common source amplifier compared to BJT amplifier?
   a) It has High input impedance
   c) No input Voltage is needed
   b) It has low input impedance
   d) Input Voltage is needed

33. If gain is need to be stabilized, which of the following element is used for a Common source amplifier?
   a) Capacitive
   c) Resistive
   b) Inductive
   d) LC tank circuit

34. What is the input impedance of voltage divider configuration?
   a) R1+R2
   c) 0
   b) RG
   d(R1*R2)/(R1+R2)

35. Which of the following is true about the effects of rd in Drain amplifier?
   a) rd Increases output impedance
   c) Output impedance remains the same
   b) rd Decreases output impedance
   d) rd Increases input impedance

36. Which of the following is the other name for Common Drain Amplifier?
   a) Source Follower
   c) Voltage booster
   b) Current Booster
   d) Voltage limiter

5. Regulators and Power Supply.

Position in Question Paper   **Total Marks-14**

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

Descriptive Questions

 1. Explain with a neat diagram, shunt voltage regulator.

 2. Explain with a neat diagram, series voltage regulator.

 3. Distinguish between unregulated & regulated power supply.

 4. Draw the block diagram of regulated power supply, explain each block in short.

 5. Explain in brief-Load & Line regulation.

 6. Write a short note on – Three terminal voltage regulator

 7. List basic elements of a power supply. Distinguish between regulated & unregulated power

 8. Calculate percentage load regulation for a voltage regulator giving 10.2V & 10V outputs at no load & full load conditions respectively

 9. Explain with the help of a block diagram three terminal IC voltage regulator.

10. Draw the functional block diagram of three terminal voltage regulator & explain brief.

11. Explain with neat circuit diagram dual power supply using IC7815 and IC7915.

12. Define line regulation & load regulation. Elaborate the difference between series shunt type voltage regulation.

13. Explain the working of shunt regulator. What are advantages over a series regulator?

MCQ Questions:-

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

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

1. What is IC 723?

   a) A voltage regulator

   b) A full-wave rectifier

   c) A half-wave rectifier

   d) A clipper

2. What is line regulation?

   a) The process of keeping Zener diode voltage constant inspite of changes in AC s/p

   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 IL

   d) The process of keeping Zener current constant irrespective of fluctuation in AC supply

3. 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

4. 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

5. In a power supply, the output voltage can vary due to multiple reasons. Which of these is not true if it is found that the output voltage is constant?

   a) The voltage stability factor is very high

   b) The output resistance is zero

   c) The temperature coefficient is zero

   d) The voltage stability factor is very small

6. The breakdown voltage of the Zener is 5V. β for the transistor is 100. R1=10kΩ R2=90kΩ, R3=30kΩ, R4=50kΩ. Calculate the total output voltage.

   a) 20V

   b) 30V

   c) 5V

   d) 50V

7. Given that the Zener diode breakdown voltage is 5V, the source voltage is 15V, the output voltage is 10V, R4 = 2kΩ, β=99, R1=2kΩ. Find IL

   a) 5.05 mA   c) 3.33 mA

   b) 4.95 mA   d) 0

8. What is not related to a transistorized series regulator?

   a) The output can be varied by using a variable resistor

   b) The output is independent of temperature

   c) The overload and short circuit protection is not required

   d) The circuit has negative feedback responsible for regulation

9. What is the output of the IC 7924?

   a) 12V   c) 24V

   b) -12V   **d) -24V**

10. In the IC 7805, what is the minimum input voltage for proper functioning?

    a) 5V   c) 7V

    b) 6V   d) 8V

11. Which is not considered as a linear voltage regulator?

    a) Fixed output voltage regulator   **c) Switching regulator**

    b) Adjustable output volt regulator   d) Special regulator

12. What is the dropout voltage in a three terminal IC regulator?

    a) $|Vin| \geq |Vo|+2v$ c) $|V in| = |Vo|$

    b) $|Vin| < |Vo|-2v$ d) $|Vin| \leq |Vo|$

13. 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

14. Which type of regulator is considered more efficient?

    a) All of the mentioned   c) Fixed output regulator

    b) Special regulator   **d) Switching regulator**

15. State the reason for thermal shutdown of IC regulator?

    a) Spikes in temperature   c) Fluctuation in temperature

    b) Decrease in temperature   **d) Increase in temperature**

16. The change in output voltage for the corresponding change in load current in a 7805 IC regulator is defined

    a) All of the mentioned   **c) Load regulation**

    b) Line regulation   d) Input regulation

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17. How the avg temp coef of output voltage expre in fixed voltage regulator?

  a) miilivolts/oC   c) None of the mentioned

  b) miilivoltsoC   d) oC/ miilivolts

18. Compute the input voltage of 7805c voltage regulator with a current Source that will deliver a 0.725A current to 65Ω, 10w load

  a) Vin = 84v   **c) Vin = 54v**

  b) Vin = 34v   d) Vin = 64v

19. 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

20. In an unregulated power supply, if load current increases, the output voltage

  a) Remains the same   c) Increases

  b) Decreases   d) None of the above

21. Voltage regulators require

  a) Only line regulation   c) A constant load

  b) Only load regulation   **d) Load and line regulation**

22. What type of regulators offer inherent short-circuit protection?

  a) Shunt regulators   c) Three-terminal regulators

  b) Series regulators   d) Switching regulators

23. Voltage regulators keep a constant …………output voltage when the input or load varies within limits

  a) DC   c) ripple

  b) AC   d) None

24. The Vo of a regulated power supply is affected by which of the following factors

  a) Input voltage   c) Temperature

  b) Load current   **d) All the above**

25. Series pass transistor always operates in the_ region in a linear IC voltage regulator

  a) Active   c) Cut-off

  b) Saturation   d) All of thes

26. Find the difference between output current having a load of 100Ω and 120Ω 7805 IC regulator. Consider the following specification: VL= 5v; VR=350mA

  a) 8.4mA   c) 9mA

  b) 7mA   d) 3.4mA

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27. The 7912 regulator IC provides _____ .

a) 5 V	c) 12 V
b) –5 V	**d) –12 V**

28. _____ Acts as a regulator

a) Zener diode	c) Tunnel diode
b) Photodiode	d) None

29. A power supply which has voltage regulation of … is unregulated p/s

a) 0 %	**c). 10 %**
b) 5 %	d) 8%

30. Commercial power supplies have voltage regulation …

a) of 10%	c) of 25%
b) of 15%	**d) within 1%**