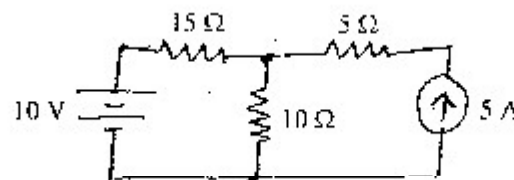


Exam.	Regular / Back	
Level	BE	Full Marks : 80
Programme	All (Except B.Arch.)	Pass Marks : 32
Year / Part	I / II	Time : 3 hrs.

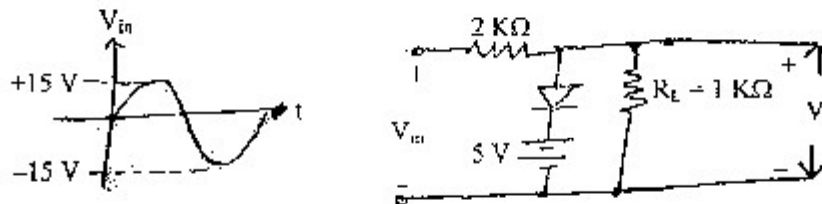
**Subject:** - Basic Electronics Engineering (EX451)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

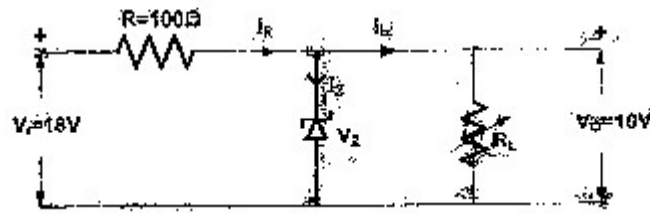
1. Define active and passive circuit component. Determine the color code of the following resistor  $75 \text{ K}\Omega \pm 10\%$ . [2+2]
2. Determine the current through  $10 \Omega$  resistance using Thevenin's theorem. [4]



3. What is a filter? Explain the types of filter with necessary diagrams. [1+3]
4. Explain large signal models of PN junction diode. [4]
5. Define clipping circuits. Draw the output waveform of circuit shown below. Assume real silicon diode. [2+2]



6. Find the Zener current in the given circuit when  $R_L = 1.2 \text{ K}\Omega$ . Assume  $V_Z = 10 \text{ V}$ . [4]



7. Explain the common emitter configuration circuit of npn transistor with the help of input and output characteristics. [6]

8. Explain the working principle of N channel depletion type MOSFET with necessary diagrams. [6]
9. State any four properties of an ideal op-amp. Design a summing amplifier using Op-Amp to get the output voltage  $V_0 = -V_1 + 2V_2 + 3V_3$ . [2+3]
10. Explain how square wave can be generated using Op-Amp and write the relation for frequency of oscillation. [4+1]
11. Define communication system and draw the complete block diagram of communication system. [2+3]
12. What is optical fiber? Explain the advantages of optical fiber communication over traditional communication system. [2+3]
13. Simplify the expression using K-map,  $Y = A'BC' + ABC' + ABC$ . [3]
14. Explain the operation of SR-flip flop with necessary diagrams and characteristics table. [6]
15. (a)  $(10101.101)_2 = (?)_{10}$  (b)  $(9001180)_{10} = (?)_{BCD}$  (c)  $(2AB.5E)_{16} = (?)_8$  [1×3]
16. What is instrumentation system? Explain the instrumentation system with the help of simple block diagram. [1+3]
17. Write short notes of any two: [2×4]
  - a) Data Logger
  - b) DMM
  - c) Strain Gauge

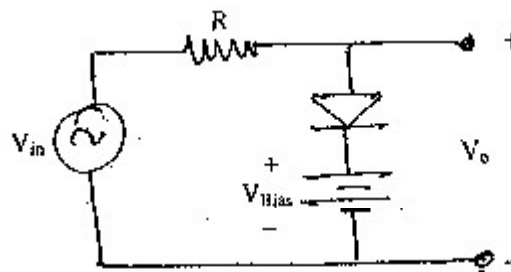
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Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	All Except (B.Arch.)	Pass Marks	32
Year / Part	I / II	Time	3 hrs.

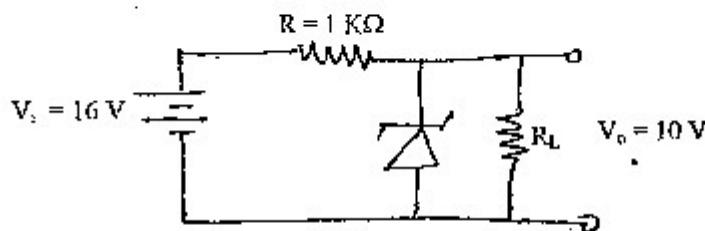
**Subject: - Basic Electronics Engineering (EX451)**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

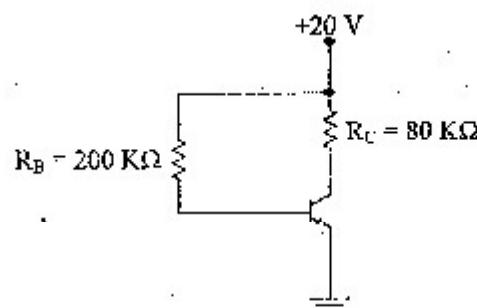
1. What do you mean by filter? Explain the RC low pass and high pass filter with corresponding transfer function and magnitude. [1+4]
2. State Thevenin's Theorem. Write down the steps for determining  $V_{th}$  and  $R_{th}$  with necessary circuit diagrams. [1+4]
3. What is rectification? Explain the operation of half wave rectifier with necessary diagrams. [1+4]
4. What are clippers? Draw the sinusoidal waveform of the following circuit and indicate the output voltage. Assume diode is ideal. [1+4]



5. Find the zener current from the given zener diode network when  $R_L = 3 \text{ K}\Omega$  and  $V_o = 10 \text{ V}$ . [5]



6. For the given circuit with  $\beta = 75$ , determine  $I_B$ ,  $I_C$  and  $V_{CE}$ . [2+2+2]



7. Explain the construction and working principle of enhancement type MOSFET? [6]
8. Explain the concept of feedback theory. Describe the working principal of square wave oscillator circuit using op-amp. [2+4]
9. State any 4 important properties of ideal Op-Amp. Draw the circuit diagram of differentiator using Op-Amp and show that output is the differentiation of input signal. [2+4]
10. What is modulation? Explain AM and FM modulated wave. [1+2+2]
11. What do you mean by electromagnetic waves? How are they propagated? Explain. [2+3]
12. Perform the following: [4×1]
  - a)  $(375.37)_8 = (?)_{16}$
  - b)  $(169.03125)_{10} = (?)_2$
  - c)  $(905)_{10} = (?)_{BCD}$
  - d) Subtract  $(25)_{10}$  from  $(49)_{10}$  using 2's complement method
13. Simplify the following Boolean expression using K-map and realize it by using universal gate of your interest. [3+2]
 
$$F(x, y, z) = xy + \bar{x}z + yz$$
14. Explain SR flip-flop with circuit. [4]
15. What is instrumentation system? Describe the instrumentation system with block diagram. [4]
16. Explain briefly about remote control or digital multimeter with necessary diagrams. [4]

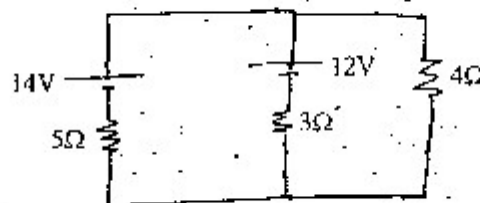
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Exam.	Regular
Level	BE
Programme	All (Except B.Arch.)
Year / Part	I / II
Full Marks	80
Pass Marks	32
Time	3 hrs.

**Subject: Basic Electronics Engineering (EX451)**

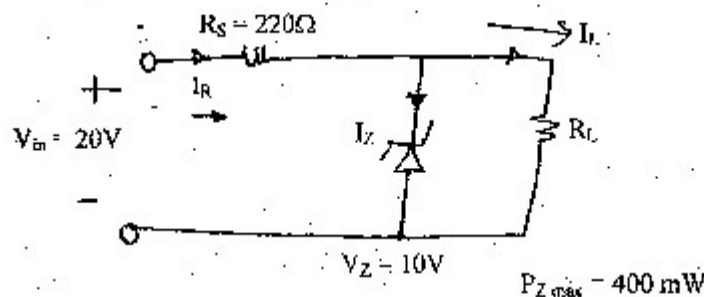
- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. State superposition theorem. In the following figure find the current flow in  $4\Omega$  resistor using superposition theorem. [2+4]



2. Explain the principle of operation of RC low pass filter with necessary diagrams and derivation. [4]
3. Explain the working principle of full wave bridge rectifier circuit with the help of necessary circuit diagrams and expressions. [6]
4. Determine  $V_L$ ,  $I_L$ ,  $I_Z$  and  $I_R$  for the network shown in figure below for following condition. [3+3]

- a) If  $R_L = 180\Omega$   
b) If  $R_L = 470\Omega$



5. Define DC load line? Explain the common emitter configuration circuit with the help of input and output characteristics curve. [2+4]
6. Explain the construction and working principle of MOSFET. [6]
7. Write the four properties of ideal operational amplifier. [2+4]
8. Explain how square wave can be generated using Op-Amp. [6]

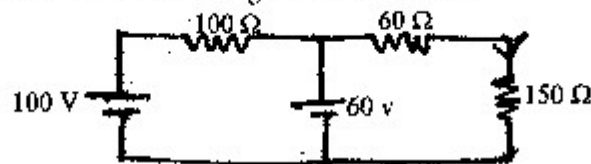
9. Define communication system. Explain amplitude modulation communication system with the help of necessary block diagrams. [6]
10. Discuss the role of antenna in communication system. What are the advantages and disadvantages of optical fiber communication? [2+4]
11. Draw the circuit of X-OR gate using NAND gates only. Perform the subtraction using 2's complement method. [2+2]
- $42_{(10)} - 115_{(10)}$ .
12. Simplify the expression using k-map [3]
- $F(x, y, z) = xyz + x'y'z + xy'z' + x'y'z' + x'yz$
13. Discuss the operation of S-R flip flop. [4]
14. Write short notes: (any two) [5×2]
- a) Clipper circuit
  - b) Strain gauge transducer
  - c) Data logger

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	All (Except B.Arch)	Pass Marks	32
Year / Part	1 / II	Time	3 hrs.

**Subject: - Basic Electronics Engineering (EX451)**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. Find the current  $I$  in  $150\ \Omega$  resistor using thevenius theorem. [6]



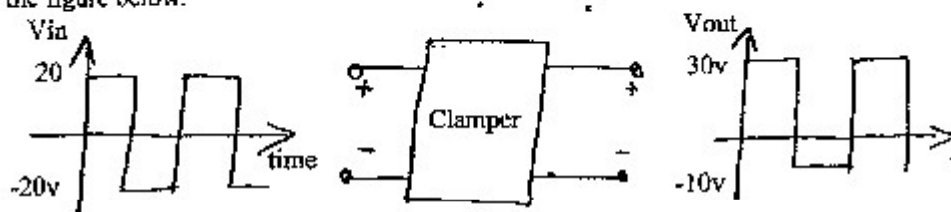
2. Find the value of resistor from following colour code. [2]

a) Red Orange Green Silver      b) Yellow Black Gold Gold

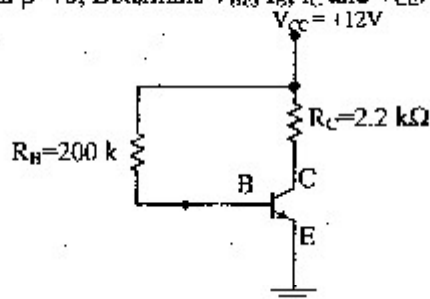
3. Explain the operation of RC high pass filter circuit with the help of necessary diagrams and figures. [4]

4. Describe IV characteristics of PN Junction diode. [6]

5. What is a clamper circuit? Design a clamper circuit to perform the function indicated in the figure below. [2+4]



6. For the given circuit with  $\beta=75$ , Determine  $V_{BE}$ ,  $I_B$ ,  $I_C$  and  $V_{CE}$ . [6]



7. Explain how BJT can be used as a switch. What are the difference between MOSFET and BJT? [4+2]

8. Explain the concept of virtual ground in op-amp. Design a summer circuit using op-amp to get the output voltage as:  $V_o = -(V_1 + 10V_2 + 25V_3)$  [2+4]
9. How do you define positive feedback? Draw the circuit for Wein bridge oscillator and explain the principle of operation. [2+4]
10. What are the advantages of optical fiber communication system? Draw and label the diagram of optical fiber. [3+3]
11. Explain why modulation is needed in Communication System. Mention any three parameters of antenna. [3+3]
12. Simplify the given function using K-map method.  $F(A, B, C) = \sum (0, 1, 2, 5) + D (3, 4, 6)$  and implement the simplified circuit using NAND only. [3+3]
13. What is the difference between combinational and sequential circuit. Discuss JK flip-flop with the help of logic diagram. [2+6]
14. Write short notes on: (any two) [3×2]
  - a) Data logger
  - b) Regulated power supply
  - c) Digital Multi-meter

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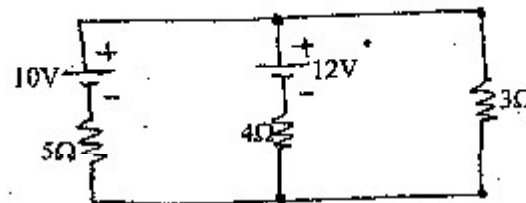


Exam.	Regular (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	All (Except B. Arch)	Pass Marks	32
Year / Part	1 / II	Time	3 hrs.

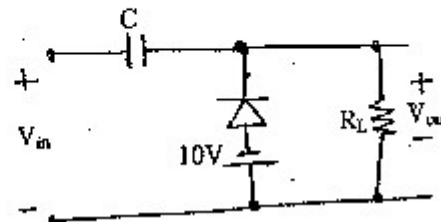
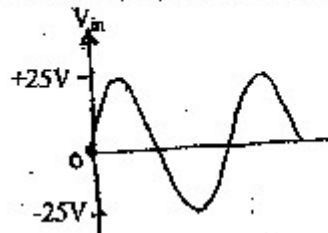
**Subject: - Basic Electronics Engineering (EX451)**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

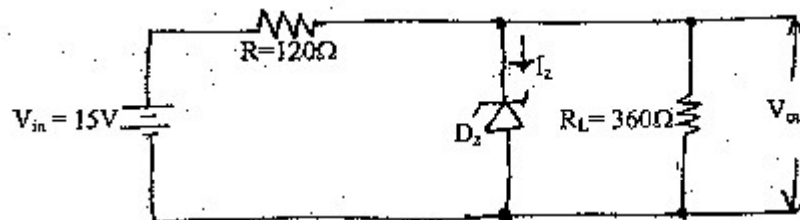
1. Define transconductance and voltage gain with reference to BJT. [3]
2. Draw RC high pass filter circuit and its characteristics graph. [2]
3. Find current flow in  $3\Omega$  resistance. Use superposition theorem to solve the problem. [5]



4. What is clamping circuit? Find the output waveform of the given circuit. [1+3]



5. Deduce AC resistance of PN junction diode at forward biased region. [3]
6. Draw bridge rectifier circuit and its output waveform. Assume input is Sinewave voltage. [3]
7. Find  $I_z$  assuming  $V_z = 9V$ . [3]



8. Find the volume of collector current, Q-point, DC load line for common emitter circuit having  $V_{CC} = 15V$ ,  $R_C = 10K\Omega$ ,  $I_B = 10\mu A$  and  $\beta = 50$ . [5]

9. Draw the circuit diagram and I-V characteristic curve to investigate output static characteristics of common emitter amplifier configuration. [3]
10. Describe the operation of CMOS NOT-gate circuit. [4]
11. State four important properties of ideal op-amp. Draw the circuit diagram of a differentiator using op-amp and show that the output is the derivative of the input. [2+4]
12. Describe the operation of Wien bridge RC-sinewave Oscillator. State Barkhausen criteria. [4+2]
13. Draw the block diagram of communication system and explain each block. [4]
14. Define amplitude modulation and frequency modulation and draw the necessary waveforms. [2+3]
15. State DeMorgan's theorems with example in each case. [4]
16. a) Verify the following: [2+2]
  - i)  $AB + \bar{A}C = (A+C)(\bar{A}+B)$  ii)  $XY + \bar{X}Z + YZ = XY + \bar{X}Z$
  - b) Find:  $(15)_{10} - (20)_{10} = ?$ , use 2's complement method. [2]
17. Draw and explain the block diagram of data logger and remote control. [5+5]
18. Define encoder. Draw truth tables of NAND and XOR gates. [2+2]

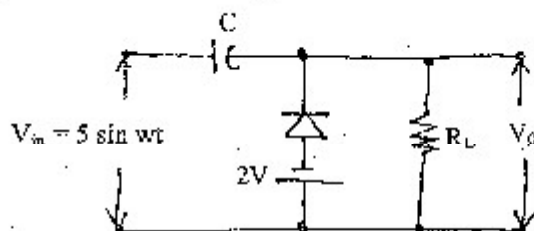
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Exam.	Regular		
Level	BE	Full Marks	80
Programme	All (Except B.Arch.)	Pass Marks	32
Year / Part	I / II	Time	3 hrs.

**Subject: - Basic Electronics Engineering**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. What do you mean by a filter circuit? Explain in brief about RC high pass filter. [1+3]
2. Define capacitance. Find the equivalent capacitance when two capacitors of capacitance  $C_1$  and  $C_2$  are connected in series. [1+3]
3. Explain the small signal model of PN junction diode and derive the expression for AC or dynamic resistance. [8]
4. What is a clipper circuit? Find the output waveform for the following circuit. [1+3]



5. In BJT circuit if  $V_{CC} = 10V$ , and  $R_C = 8k\Omega$ , draw the dc load line. Determine the Q-point (operating point) for zero input signal if  $I_B = 15\mu A$  and  $\beta = 40$ . [8]
6. Why BJT is a bipolar and MOSFET is a unipolar device? And draw the circuit diagram of differential amplifier using BJT. [2+2]
7. Design the summing amplifier using Op-Amp to get the output voltage:  $V_o = 3V_1 + 2V_2 + V_3$ . [6]
8. Explain how square wave can be generated using Op-Amp and write the relation for frequency of oscillation. [4]
9. Define communication system and draw the complete block diagram of communication system. [2+4]
10. What is optical fiber? Write short notes on optical fiber. [1+3]
11. Explain the working principle of n-channel Enhancement type MOSFET. [7]
12. Subtract  $(111)_2$  from  $(110)_2$  using 2's complement method. Draw the circuit of AND gate using NOR gates only. [3+3]
13. Explain the operation of SR-flip flop with necessary diagrams and characteristic table. [6]
14. Write short notes on: (any three) [3×3]
  - a) Regulated power supply
  - b) Transducer
  - c) Oscilloscope
  - d) Data logger

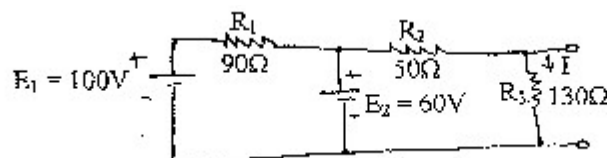


Exam.	Regular / Back		
Level	BE	Full Marks	80
Programme	All (Except B. Arch)	Pass Marks	32
Year / Part	I / II	Time	3 hrs.

**Subject: - Basic Electronics Engineering**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. a) Describe the principle of Thevenin's theorem by solving following problem. [7]



Find the current  $I$  in  $R_3$ .

- b) Draw the circuit diagram of RC low filter and explain its operation with the help of frequency dependent output waveform. [7]
2. a) Draw and explain the I-V characteristics curve of P-N junction diode for forward and reverse bias region. [7]
- b) Draw Zener voltage regulator circuit and explain clearly the working principle of this circuit to produce a regulated dc output. [7]
3. a) Describe output characteristics of common emitter configuration with the help of circuit diagram and IV characteristics graph. [7]
- b) Describe the construction and working principle of N Channel E-MOSFET. [7]
4. a) State four important properties of ideal op-amp. Draw the circuit diagram of differentiating amplifier using op-amp and derive the expression for  $V_{out}$ . [2+5]
- b) i) Draw the circuit diagram of Wien Bridge oscillator circuit for sinusoidal wave form. [4+3]  
ii) Draw square wave oscillator circuit.
5. a) Perform the conversion of the following: [6]
- $(10111.101)_2 = (?)_{10}$
  - $(AFC.00)_{16} = (?)_8$
  - $(901)_{10} = (?)_{BCD}$
- b) Simplify the expressions and draw the circuits [6]
- $\bar{A} \bar{B} \bar{C} + \bar{A} \bar{B} C + A \bar{B} \bar{C} + A \bar{B} C$
  - $A \bar{C} + ABC + A(C + A \bar{C})$
6. Write short notes on any TWO: [2×6]
- Strain Gauge
  - $\lambda/2$  Dipole Antenna
  - Transducer
  - Amplitude Modulation (AM)

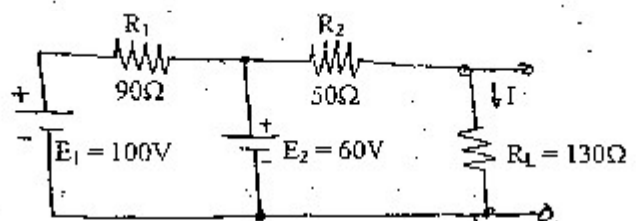


Exam.	New Back (2066 Batch Only)		
Level	BE	Full Marks	80
Programme	All Except B.Arch.	Pass Marks	32
Year / Part	I / I	Time	3 hrs.

**Subject: - Basic Electronics Engineering**

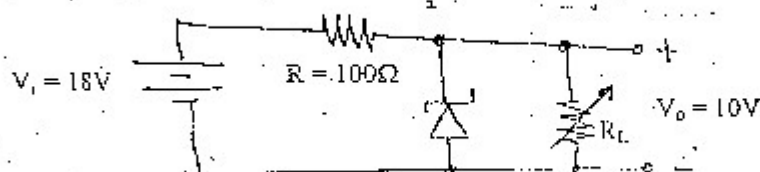
- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. a) Describe the principle of superposition theorem by solving following problem. [5]



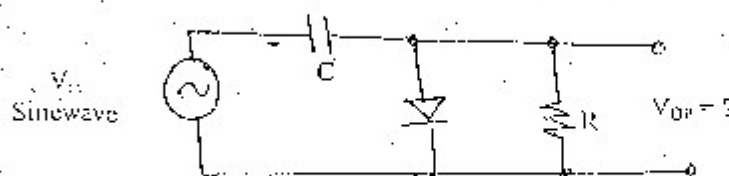
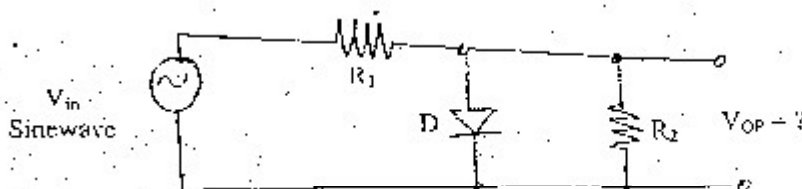
Find current  $I$  through  $R_4$ .

- b) Explain the concept of voltage gain and transconductance using block diagram. [3]
2. a) Describe the working principle of PN junction diode with the help of circuit diagram and its IV characteristics graph. [3]
- b) Find zener current in the given circuit when  $R_L = 1.2k\Omega$ . [3]

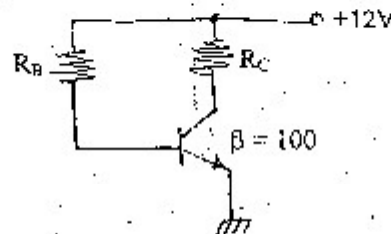


Assume  $V_Z = 10V$ .

3. a) Draw bridge rectifier circuit and its output waveform with output load resistor ( $R_L$ ) connected. Express the ripple factor if smoothing capacitor,  $C$  is connected to the circuit. [3]
- b) Draw output waveforms of the following circuits and indicate the peak output voltage. Assume diode is ideal. [3]



4. a) Draw basic differential amplifier circuit and indicate its input and output voltage waveforms. [2]
- b) Describe the operation of CMOS NOT-gate circuit. [4]
- c) Find  $R_B$  and  $R_C$  in the given circuit. Given data are:  $I_C = 1.2\text{mA}$ ,  $V_{CE} = 6\text{V}$  and  $\beta = 100$ . [4]



5. a) State six important properties of ideal opamp. [3]
- b) Derive voltage gain for noninverting amplifier using ideal opamp. [3]
- c) Describe the operation of square wave generator using opamp. [4]
6. a) Define antenna and electromagnetic wave (EMW) propagation. [4]
- b) Explain and enlist wired and wireless communication systems. [4]
- c) Draw a block diagram of AM super heterodyne radio receiver. [2]
7. a) Why NOR and NAND gates are called universal gates? Explain with examples. [3]
- b) Draw a block diagram of edge triggered, with preset and clear facilities, D-flip flop and its truth table. State one important advantage over RS flip flop. [3]
8. a) State and prove De Morgan's Theorems. [3]
- b) Convert the followings: [3]
  - i)  $33_{10}$  to binary
  - ii)  $(1100\ 0011)_2$  to decimal
  - iii) Add  $(1001)_2$  and  $(0111)_2$
9. a) Draw the block diagram of (CRO) oscilloscope. And explain its working function. [4]
- b) Draw the block diagram of DMM (Digital Multimeter). And explain how it measures DC voltage, DC current and resistance. [6]
10. Write short notes on: (any two) [2x4]
  - a) Graphical analysis of diode circuit
  - b) Shift register and counter
  - c) E-MOSFET

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