INSTITUTE OF ENGINEERING
Examination Control Division

2079 Ashwin

Level	BE	Full Marks	80
Programme	BCE, BEL, BEX, BCT, BME, BAM, BIE, BAG, BGE	Pass Marks	32
Year / Part	I / II	Time	3 hrs.

Subject: - Basic Electronics Engineering (EX 451)

✓ 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. Explain dependent and independent signal sources with suitable symbols and examples. [4]

2. Explain the operation of RC High pass filter with necessary circuit diagram and transfer characteristics curve. [4]

3. Find the output waveform of the given input wave. (Assume diode is ideal). [4]
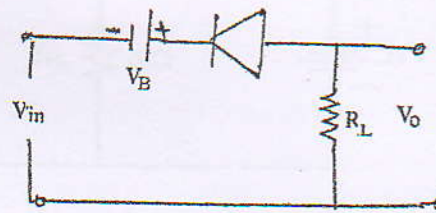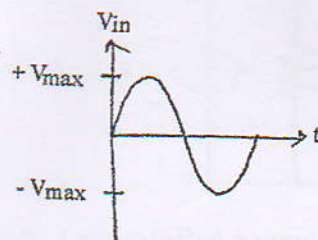
4. Describe the AC model of semiconductor diode and derive the expression for small signal incremental resistance of the diode. [4]

5. If $V_{cc} = 10V$, $R_B = 900 K\Omega$, $R_c = 2K\Omega$ and $\beta = 150$, calculate the collector current I_c for collector feedback type dc biasing circuit. [5]

6. Explain operation of CMOS NOR with necessary diagram. [5]

7. Explain the operation of BJT as a switch. [6]

8. Design summing amplifier to using Op-Amp to get the output voltage $V_0 = -V_1+2V_2+3V_1$. [5]

9. Derive output voltage expression for Op-amp integrator and differentiator. [4+4]

10. Draw the circuit diagram of Triangular wave generator and write its frequency of oscillation. [3]

11. Define modulation. Explain Amplitude Modulation (AM) in brief with necessary waveforms and expressions. [1+4]

12. Illustrate block diagram of digital communication system. [4]

13. Perform the following: [4]

   a) $(573.73)_8 = (?)_{16}$
   b) $(267.02135)_{10} = (?)_2$
   c) $(508)_{10} = (?)_{BCD}$
   d) Subtract $(24)_{10}$ from $(48)_{10}$ using 2's complement method.

Simplify Boolean Expression by using K-MAP. Also draw circuit.

$F = A'C+A'B+AB'C+BC$ [6]

Construct T flip-flop with its characteristics table and equation. [5]

Write short notes on: (Any Two) [2×4]

   a) Strain gauge
   b) Regulated power supply
   c) Digital multimeter

TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2079 Jestha

| Exam.		Back		
Level	BE	Full Marks	80
Programme	All except BAR	Pass Marks	32
Year / Part	I / II	Time	3 hrs.

Subject: - Basic Electronics Engineering (EX 451)

✓ 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. Thevenise the following circuit and calculate the current flowing through RL. [5]
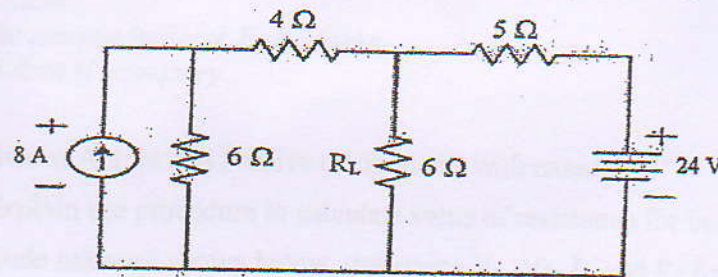
2. Define active and passive components in electronic system. Calculate the value of resistor having color codes YELLOW, VOILET, ORANGE, GOLD. [4]

3. Explain the operation of RC high pass filter with necessary diagram. [4]

4. Explain forward and reverse characteristics of semiconductor diode with diagrams. [5]

5. Explain large signal models of semiconductor diode with necessary diagrams. [5]

6. Explain the operation of full wave center tapped rectifier with necessary diagrams. [5]

7. The circuit of figure below uses two zener doides, each rated at 15 V, 200 mA. If the circuit is connected to a 45-volt unregulated supply, determine: (i) The regulated output voltage (ii) The value of series resistance R. [5]
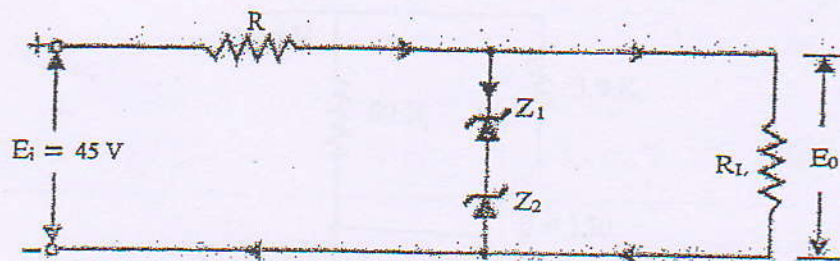
8. Explain common emitter configuration of NPN transistor with its characteristics with necessary diagrams. [5]

9. Calculate the Q point of the voltage divider biasing circuit where VCC = 15V, R1 = 10K, R2 = 5K, RC = 1K, RE = 2K and $\beta = 100$. [5]

10. Explain the operation of N channel enhancement type MOSFET with necessary diagram. [5]

11. Write down the properties of idle op.amp. Design the op amp circuit that produces output $V_0 = 4V_1 + 2V_2 - 0.5V_3$. [2+3]

12. Draw the circuit diagram for sine wave oscillator using op-amp. Write the formula for frequency calculation. [3]

13. Simplify the Boolean function using k map and realize the logic circuit.

F $\sum(0,1,2,4,5,6,8,9,12,13,14)$.

14. Explain the block diagrams of communication system. Write down the advantages of FM over AM. [5]

15. Explain the operation of JK flip flop with necessary diagram. [5]

16. Write short notes on: (Any two) [2×4]

   a) Data logger
   b) DMM
   c) Remote control

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| Exam.		Regular	
Level	BE	Full Marks	80
Programme	BCE, BEL, BEX, BCT, BME, BAM, BIE, BAG, BGE, BAS	Pass Marks	32
Year / Part	I / II	Time	3 hrs.

Subject: - Basic Electronics Engineering (EX 451)

✓ 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. Differentiate between Active and Passive components with examples. [3]

2. What is filter? Explain the procedure to calculate value of resistance for band 5. [1+3]

3. For the Zener diode network shown below, determine V_L, V_R, I_Z and P_Z for $R_L = 3$ KΩ. [4]
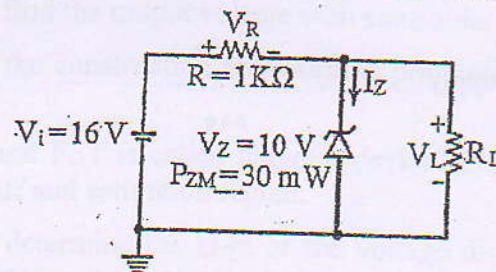
4. Explain the working principal of full wave Bridge rectifier circuit and define its parameters. [5]

5. Find I_{BQ}, I_{CQ}, V_{CEQ}, I_{Csat} and V_{CEsat} from the given voltage divider circuit. [6]
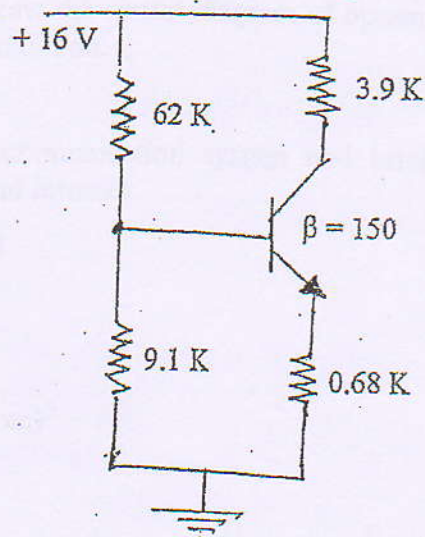
6. Explain N-channel E-MOSFET operation along with its characteristic curve. [7]

7. Draw the circuit diagram of BJT differential amplifier. [3]

8. Mention any four properties of an ideal op-amp. Derive the expression of voltage gain of an inverting amplifier using op-amp. [2+4]

9. State Barkhausen criteria for oscillation. Draw Wein bridge oscillator circuit to generate sine wave and derive the frequency of the generated sine wave.　　[2+4]

10. Differentiate between positive and negative feedback system with applications.　　[4]

11. Describe properties of EMW propagation. Draw structure of Optical fiber.　　[3+2]

12. Differentiate between Internet and Intranet.　　[3]

13. Convert the following:　　[5]

   a) $(257.24)_8 = (?)_{10}$
   b) $(3B9)_{16} = (?)_8$
   c) $(10110)_{Grey} = (?)_2$
   d) $(2345.67)_{10} = (?)_{16}$
   e) Subtract $(49)_{10}$ from $(37)_{10}$ using 2's complement method

14. Describe SR latch with necessary circuit diagram and truth table.　　[6]

15. Simplify the following Boolean Expression using K-Map and implement the simplified expression using NAND gate only: $F(A, B, C) = \Sigma (0, 1, 2, 5) + D (3, 4, 6)$　　[3+2]

16. Write short notes on: (Any Two)　　[2×4]

   a) Data logger
   b) Digital Multimeter
   c) Regulated power supply

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division

2078 Baishakh

| Exam.		Back		
Level	BE		Full Marks	80
Programme	BCE, BEL, BEX, BCT, BME, BAM, BIE, BAG, BGE, BAS		Pass Marks	32
Year / Part	I / II		Time	3 hrs.

Subject: - Basic Electronics Engineering *(EX 451)*

✓ 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 the difference between Active and Passive components. Describe the operation of RC high pass filter with necessary diagrams. [1+4]

2. Using the principle of superposition, find the current i through the 3 Ω resistor in figure below. [5]
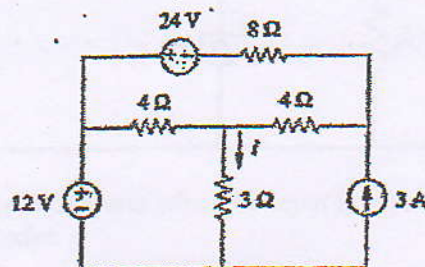
3. What is diode? Explain large signal model of PN junction diode. [1+5]

4. Draw the circuit diagram of differential amplifier using BJT. [2]

5. Explain the construction and working principle of Enhancement type N-channel MOSFET with necessary mathematical expression and characteristic curves. [6]

6. Determine the collector current (I_C) and collector emitter voltage (V_{CE}) of the following BJT circuit. [5]
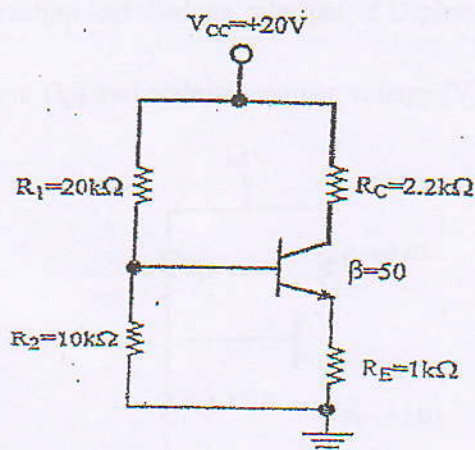
7. Draw the circuit diagram of CMOS inverter. [3]

8. What do you mean by virtual short circuit in Op-amp. Draw the circuit diagram of differentiating amplifier using op-amp and derive the expression for output voltage. [1+4]

9. Describe the operation of square wave generator using op-amp and find its frequency of oscillation. [5]

10. What is operational amplifier? Explain Wein bridge oscillator. [1+5]

11. Describe communication system in brief with a complete block diagram. [4]

12. Draw and explain the block diagram of data logger and oscilloscope. [4+4]

13. What is Antenna? Discuss the role of Antenna in communication system. [2+2]

14. Convert the following number system into: (Any Three) [3×2]
    a) $(59.60)_{10}$ ---- $(\ )_2$
    b) $(37.FE)_{16}$ ---- $(\ )_8$
    c) $(11.011)_2$ ---- $(\ )_{10}$
    d) $(33.25)_8$ ---- $(\ )_{10}$

15. Solve using k-map: $F = A'B'C' + B'CD' + A'BCD' + AB'C'$. [6]

16. Explain the operation of JK flip-flop with necessary diagrams and characteristics table. [4]

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Subject: - Basic Electronics Engineering *(EX 451)*

✓ 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. Write the color coding of the following values of resistors: [4]
   a) $47 \pm 5\%\, k\Omega$ b) $548 \pm 10\%\Omega$

2. Explain RC low pass filter with necessary derivations and diagrams. [4]

3. Find the Zener Current in the given circuit when $R_L = 1.2\, k\Omega$. Assume $V_Z = 10V$. [4]
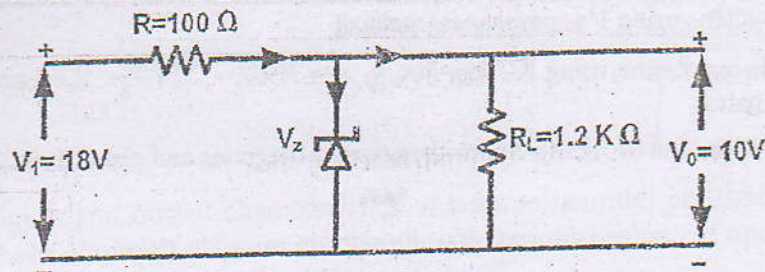
4. Find the output voltage waveform when the input is applied to the circuit a shown in the figure using silicon diodes. [4]
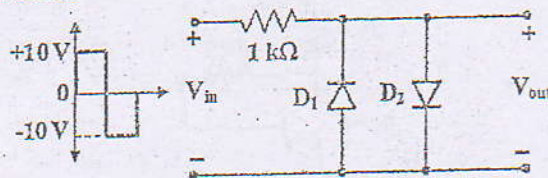
5. Describe the input and output characteristics of common emitter BJT configuration with the help of circuit diagram and graph with various region of operation. [6]

6. Describe the construction and working principal of Depletion MOSFET with necessary diagrams. [5]

7. Find collector current (I_C) and collector emitter voltage (V_{CE}) of the BJT circuit given below with $\beta = 100$. [5]
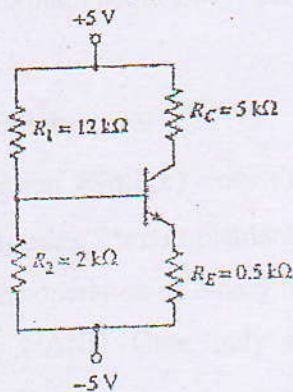
8. List out ideal characteristics of op-amp. Derive voltage gain of non-inverting op-amp configuration. [2+4]

9. Design the summer circuit using operational amplifier: [5]
$$V_0 = V_1 + 2V_2 + 3V_3$$

10. Explain the concept of gain stability. Describe the working principal of square wave generator circuit using operational amplifier. [1+4]

11. Explain the complete block diagram of communication system. [4]

12. What is optical fiber? What are the advantages of optical fibers over traditional communication systems? [1+3]

13. Write short notes on: (Any Two) [2×4]
    a) Strain gauge   b) Data logger   c) Digital multimeter

14. Convert the following: (Any Three) [3×2]
    a) $(10101.101)_2 = (?)_{10}$
    b) $(9001180)_{10} = (?)_{BCD}$
    c) $(2AB.5E)_{16} = (?)_8$
    d) $(34)_{10} - (12)_{10}$ using 1's complement method.

15. Simplify the expression using K-Map, $F(x, y, z) = X'YZ + X'Y'Z + XYZ$ and realize it using logic gates. [6]

16. Explain the operation of JK flip-flop with necessary diagrams and characteristics table. [4]

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04 TRIBHUVAN UNIVERSITY

INSTITUTE OF ENGINEERING

Examination Control Division

2076 Baisakh

| Exam.		**Back**		
Level	BE	Full Marks	80	
Programme	All (Except BAR)	Pass Marks	32	
Year / Part	I / II	Time	3 hrs.	

Subject: - Basic Electronics Engineering *(EX 451)*

✓ 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 dependent or controlled source. Briefly explain its type with suitable examples. [5]

2. Differentiate between active and passive components. [3]

3. Explain the operation of Varactor diode with its characteristic curve. [5]

4. Sketch V_0 for given network. Assume diode is made of silicon. [5]
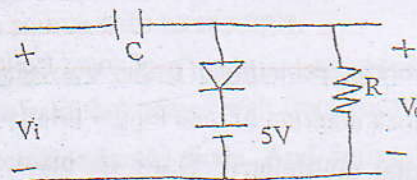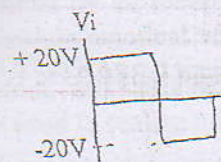
5. Describe the input and output characteristics of common emitter configuration circuit of BJT with the help of circuit diagram and graph with various regions of operation. [6]

6. Determine Quiescent levels of ICQ and VCEQ for the network. [6]
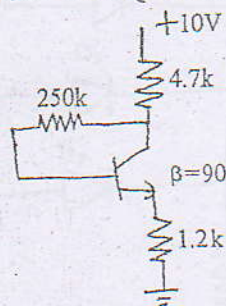

7. Derive the expression of output voltage for integrator and differentiator using op-amp. [5]

8. State the Barkhausen Criteria for oscillation. Show how square wave is generated using Op-amp. [2+6]

9. What is electromagnetic wave? Explain about EMW propagation. [1+3]

10. Differentiate between: [3+3]
    a) Internet and Intranet
    b) Broadcasting and Communication

11. Using K-map simplify the expression $F(a,b,c) = \bar{a}bc + b\bar{c} + ab\bar{c} + a\bar{b}c$ [4]

12. Substract $(11100)_2$ from $(10011)_2$ using 2's complement method. [3]

13. Define Demultiplexer. Explain the operation of binary to octal decoder. [6]

14. Construct S-R flip-flop using NAND Gate only and explain the operation with characteristic table. [6]

15. Draw a basic lock diagram of oscilloscope and explain its function. [5]

16. Write short notes on: (Any one) [3]

13. Obtain the simplified expression for the following boolean function using K-Map.

$$F(x, y, z) = \Sigma m (0, 2, 4, 5, 6)$$

14. Construct clocked SR flip-flop with its characteristics table and equation.

15. For the circuit given below determine I_B, I_C and V_{CE}.
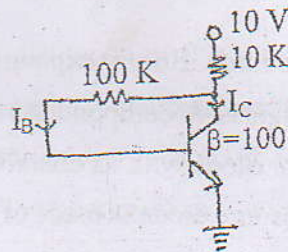
16. Explain the working principle of n-channel Enhancement type MOSFET.

17. Explain the block diagram of data logger briefly.

18. What is a digital multimeter? Draw its block diagram and explain how it measures resistance.

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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 *(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 an ideal voltage source? Why is this voltage source practically unrealizable? Explain practical voltage source with an example. [1.5+1+1.5]

2. Why are resistors, inductors and capacitors called passive elements? How can these components be used to realize a filter circuit that passes high frequency signals only? [1+3]

3. Describe the small signal model of semiconductor diode. And derive the expression for dynamic resistance rd. [6]

4. Assuming diodes used in the circuit are ideal. Find current through 1 KΩ resistor. [4]
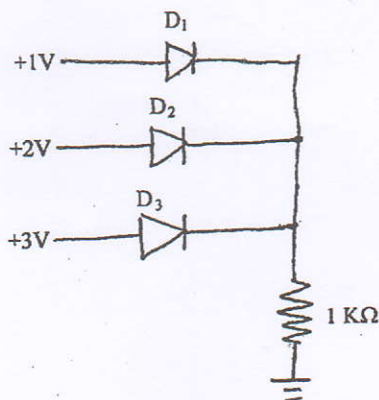

5. Design Op-amp circuit to get output $V_0 = 0.5V_1 - 2V_2 - V_3$. Here V_1, V_2 and V_3 are three input voltage source. [4]

6. Explain the working of triangular wave generator with necessary diagram. [5]

7. Draw the circuit diagram of Wien bridge Oscillator. Write frequency of Oscillation. [3]

8. Explain the need of modulation in a communication system. [3]

9. Explain the block diagram of optical fibre communication and explain the advantages of optical communication over copper cable communication. [6]

10. Convert the following numbers as indicated. [1.5×2]

   a) $(EIA)_{16} = ( )_8$ b) $(35.7)_{10} = ( )_2$

11. State and prove De-Morgan's Theorems. [3]

12. Define encoder. Explain the operation of octal to binary encoder with logical diagram. [6]

13. Obtain the simplified expression for the following boolean function using K-Map. [3]

$F(x, y, z) = \Sigma m (0, 2, 4, 5, 6)$

14. Construct clocked SR flip-flop with its characteristics table and equation. [5]

15. For the circuit given below determine I_B, I_C and V_{CE}. [2+2+2]
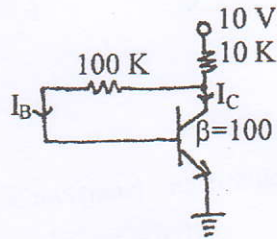
16. Explain the working principle of n-channel Enhancement type MOSFET. [6]

17. Explain the block diagram of data logger briefly. [4]

18. What is a digital multimeter? Draw its block diagram and explain how it measures resistance. [1+4]

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Exam.		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. Determine Vth, Rth and the current through 5 KΩ resistor using Thevenin's theorem. [4]
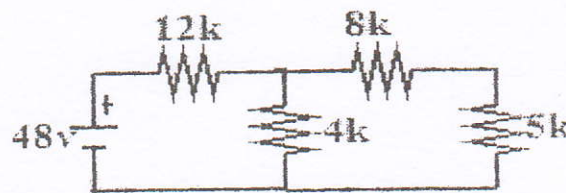

2. What do you mean by a filter circuit? Explain the operation of RC low pass filter with its transfer function and frequency response. [4]

3. Explain large signal models of PN junction diode. [4]

4. Explain the working principle of full wave bridge rectifier with necessary diagrams and expressions. [4]

5. Draw the DC load line and determine the Q point of the voltage divider biased transistor circuit having V_{CC} = 20v, RC = 2K, R1 = 20k, R2=10k, RE=4k, β=100. [6]

6. Describe the construction and working principle of n-channel depletion type MOSFET with necessary diagrams. [6]

7. Explain the operation of CMOS invertor with necessary diagram. [4]

8. Describe the working principle of square wave generator circuit using operational amplifier. [4]

9. What do you mean by virtual short circuit in OP amp? Draw the circuit diagram of the inverting integrator and show that the output is proportional to the time-integrai of the input. [2+2+2]

10. State Barkhausen criteria for oscillation. Draw Wein bridge oscillator circuit to generate sine wave and derive the frequency of the generate sine wave. [2+2+2]

11. Explain working principle of optical fiber. List out the advantages of optical fiber communication over copper cable communication. [2+4]

12. Write short notes: (any two) [2×3]

   i) Data Logger
   ii) Digital Multimeter (DMM)
   iii) Regulated Power Supply

13. What is an anetenna? Explain any two properties of the antenna. [2+2]

14. Simply the expression using K-Map, F(A,B,C)=A'B+BC'+AC'. [4]

15. Explain the operation of JK flip-flop with necessary diagrams and characteristic table. [6]

16. What is multiplexer (MUX) Explain 4:1 Multiplexer. [6]

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 *(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 is Active and Passive Component? Define transconductance and voltage gain with reference to BJT. [2+4]

2. Draw the circuit diagram of RC High pass filter and explain its operation with the help of frequency dependent response at the output. [5]

3. Find the Zener Current in the given circuit when R_L = 1.2 KΩ. Assume V_Z = 10 V. [5]
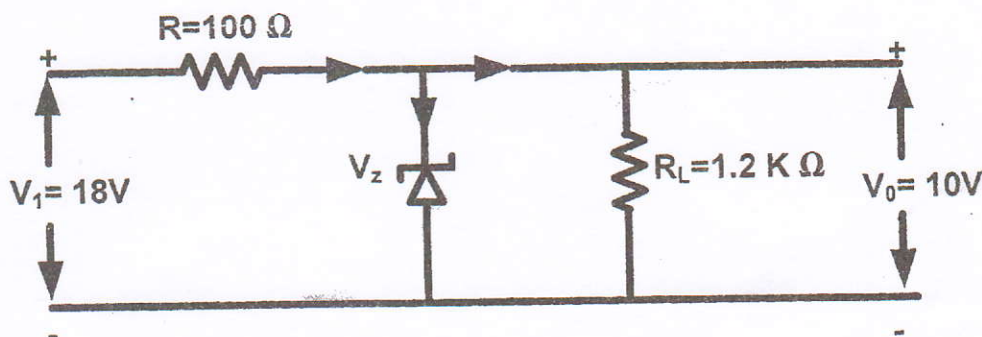

4. What is clipper and clamper circuit? [2]

5. Draw emitter feedback bias circuit of BJT by labeling all the circuit components. Find I_C and V_{CE} in the circuit if V_{CC} = +12 V, R_B = 430 kΩ, R_C = 2 kΩ, R_E = 1 k Ω and β = 50. [2+4]

6. Draw the circuit diagram of differential amplifier using BJT. [2]

7. Describe the working principle of n-channel enhancement type MOSFET. [6]

8. Mention any four properties of ideal Op-amp. Derive the expression of voltage gain of non-inverting amplifier using Op-amp. [2+4]

9. State Barkhausen criteria. Draw the circuit diagram of square wave generator and explain how it works. [2+4]

10. Draw the circuit diagram of Wien Bridge oscillator. [4]

11. Differentiate between following communication systems. [3+3]

    i)   Wired and wireless communication system
    ii) Broadcasting and communication

12. What are the advantages and disadvantages of optical communication system? [4]

13. Write short notes on: (any two) [2×3]

    i)   Oscilloscope
    ii) Data logger
    iii) Regulated power supply using IC

14. State DeMorgan's theorem. Subtract $(1111)_2$ from $(1110)_2$ using 2's complement method. [3+3]

15. Simplify an expression $F(A,B,C,D) = \sum(1,3,7,9,11,14,15)$ by using K-map. [4]

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 (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. Describe different types of controlled source with figures. [4]

2. Calculate the current flowing in each branch using superposition theorem. [6]
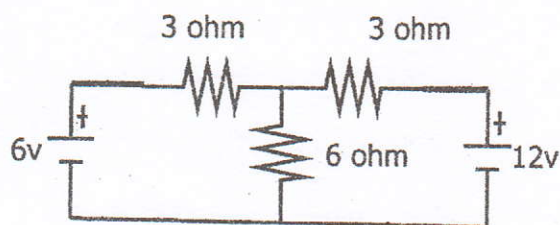
3. Describe the rectification process. Explain the operation of half wave rectifier with necessary diagrams. [1+4]

4. What is diode clamper? Describe the operation diode clamper circuit. [1+4]

5. Draw the DC load line and determine the Q point of the voltage divider biased transistor circuit having Vcc = 15v, Rc = 1kΩ, R1 = 10 kΩ, R2 = 5kΩ, Rc = 2kΩ and β = 75. [6]

6. Why BJT is a bipolar and MOSFET is an unipolar device? And draw the circuit diagram of differential amplifier using BJT. [2+2]

7. Explain the operation of CMOS switch with necessary diagrams. [4]

8. Mention any four properties of an ideal OP amp. Derive the expression of voltage gain of an inverting amplifier using OP amp. [2+4]

9. Draw a circuit diagram of square wave generator using OP amp. Explain how it generates the square wave. Express the frequency of the square wave generated. [2+3+1]

10. What is Optical fiber? Explain the advantages of optical fiber communication over coaxial cable communication. [1+3]

11. Define communication system. And describe communication system in brief with the complete block diagram. [2+3]

12. Simplify the expression using K-Map, $F(x,y,z) = X'YZ+X'Y'Z+XYZ$ and realize it using logic gates. [5]

13. Mention the types of flip flops and explain the operation of J-K flip flop with necessary diagrams. [1+4]

14. Draw a block diagram of digital multimeter. Explain how it measures dc current flowing through it. [5]

15. Draw and explain the block diagram of data logger. [4]

16. Write short notes on: (any two) [2×3]

   a) Light emitting diode
   b) Output characteristics of common base configuration

| 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 K$\Omega \pm$ 10%. [2+2]

2. Determine the current through 10 Ω resistance using Thevenin's theorem. [4]
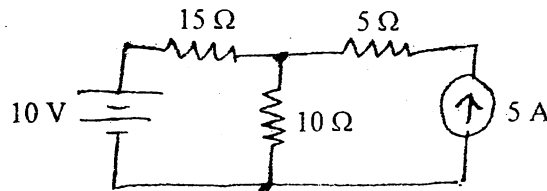
3. What is a filter? Explain the types of filter with necessary diagrams. [1+3]

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]
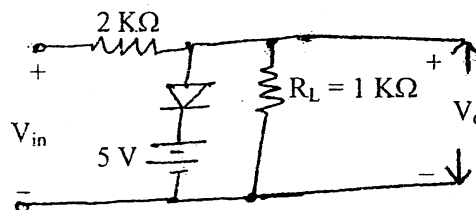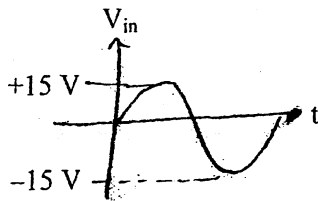
6. Find the Zener current in the given circuit when R_L = 1.2 KΩ. Assume V_Z = 10 V. [4]
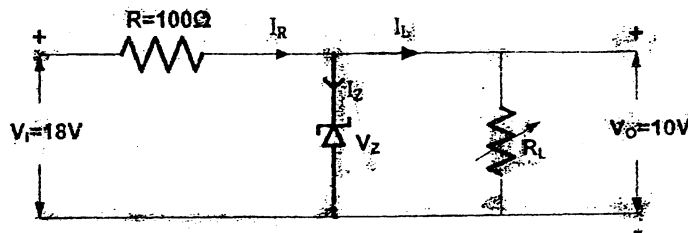
7. Explain the common emitter configuration circuit of npn transistor with the help of input and output characteristics. [6]
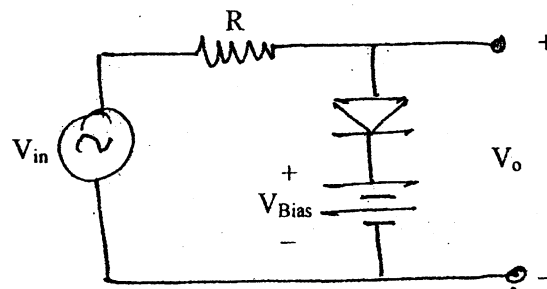
8. Explain the working principle of N channel depletion type MOSFET with necessary diagrams. [6]

9. State any four properties of an ideal op-amp. Design a summing amplifier usign 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

***

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 $R_L = 3$ KΩ and $V_o = 10$ V. [5]
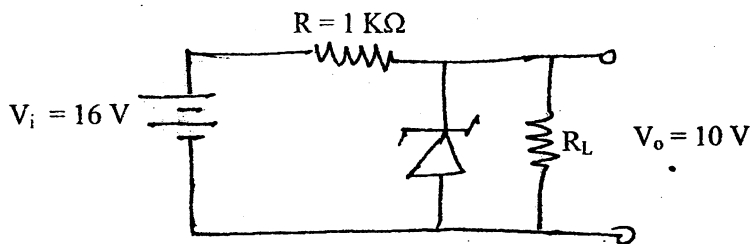
6. For the given circuit with $\beta = 75$, determine I_B, I_C and V_{CE}. [2+2+2]
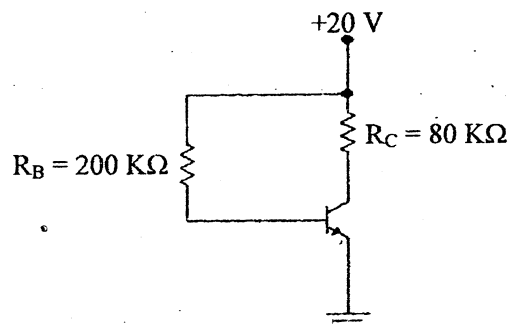
7. Explain the construction and working principle of enhancement type MOSFET? [6]

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	Full Marks	80
Programme	All (Expect 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. State superposition theorem. In the following figure find the current flow in 4 ohm resistor using superposition theorem. [2+4]
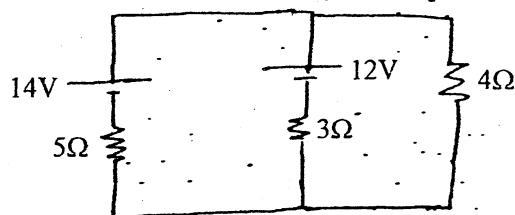
2. Explain the principle of operation of RC low pass filter with necessary diagrams and derivation. [4]

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 $R_L = 470 \, \Omega$
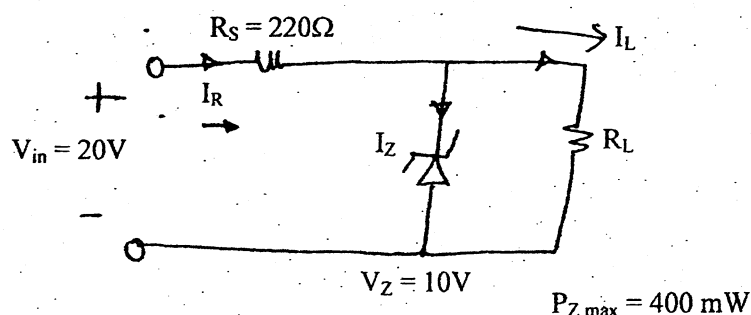
5. Define DC load line? Explain the common emitter configuration circuit with the help of input and output characteristics curve. [2+4]

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 [4]

$F(x, y, z) = xyz + x'y'z + xy'z' + x'y'z' + x'yz$

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	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. Find the current I in 150 Ω resistor using thevinius theorem. [6]
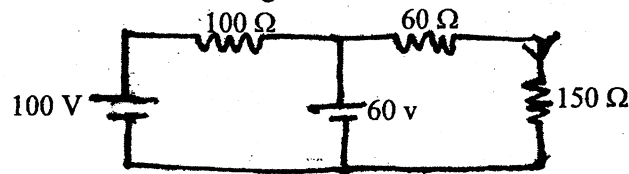

2. Find the value of resistor from following colour code. [2]

   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]
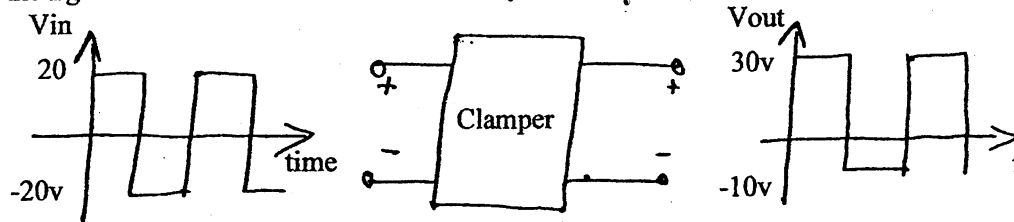
6. For the given circuit with β=75, Determine V_{BE}, I_B, I_C and V_{CE}. [6]
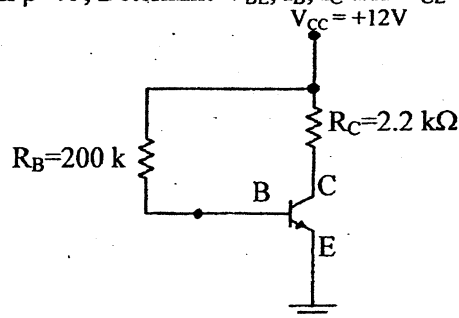
7. Explain how BJT can be used as a switch. What are the difference between MOSFET and BJT? [4+2]

8. Explain the concept of virtual ground in op-amp. Design a summer circuit using op-amp to get the output voltage as: $V_0 = -(V_1 + 10V_2 + 25V_3)$ [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. Simply the given function using K-map method. F(A, B,C)=Σ (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	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 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 3Ω resistance. Use superposition theorem to solve the problem. [5]
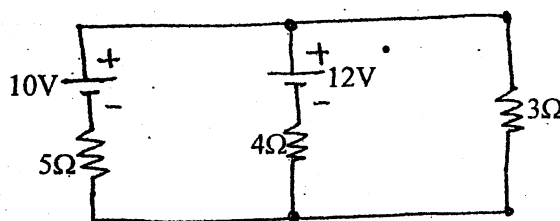
4. What is clamping circuit? Find the output waveform of the given circuit. [1+3]
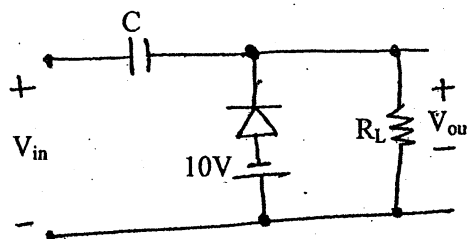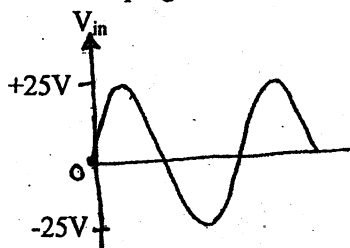
5. Deduce AC resistance of PN junction diode at forward biased region. [3]

6. Draw bridge rectifier circuit and its output waveform. Assume input is Sinewave voltage. [3]

7. Find I_z, assuming $V_z = 9V$. [3]
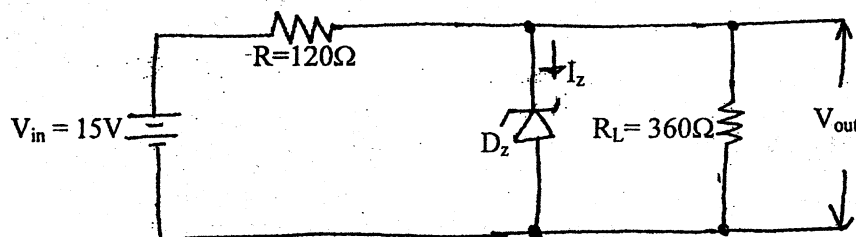
8. Find the volume of collector current, Q-point, DC load line for common emitter circuit having $V_{CC} = 15V$, $R_C = 10K\Omega$, $I_B = 10\mu A$ and $\beta = 50$. [5]

7

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]
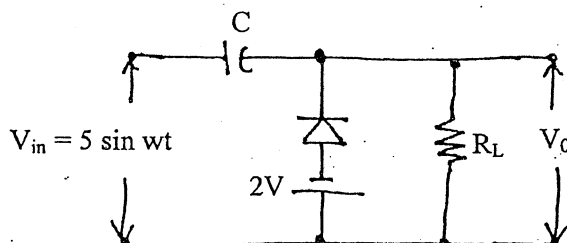
5. In BJT circuit if $V_{CC} = 10V$, and $R_C = 8k\Omega$, draw the dc load line. Determine the Q-point (operating point) for zero input signal if $I_B = 15\mu A$ and $\beta = 40$.   [8]

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: $V_0 = 3V_1 + 2V_2 + V_3$.   [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 Thevenins theorem by solving following problem.   [7]·
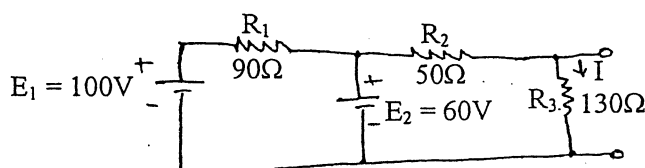

Find the current I in R_3.

   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]

       i) $(10111.101)_2 = (?)_{10}$
       ii) $(AFC.00)_{16} = (?)_8$
       iii) $(901)_{10} = (?)$ BCD

   b) Simplify the expressions and draw the circuits   [6]

       i) $\overline{A}\,\overline{B}\,\overline{C} + \overline{A}\,\overline{B}C + A\overline{B}\,\overline{C} + A\overline{B}C$
       ii) $A\overline{C} + ABC + A(C + A\overline{C})$

6. Write short notes on any two: [2×6]

   a) Strain Gauge
   b) λ/2 Dipole Antenna
   c) Transducer
   d) Amplitude Modulation (AM)

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| Exam.		New Back (2066 Batch Only)	
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 superposition theorem by solving following problem. [5]
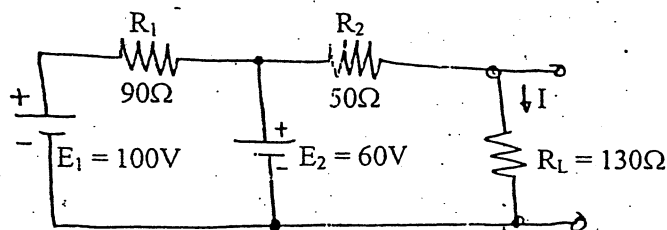
Find current I through R_L.

   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]
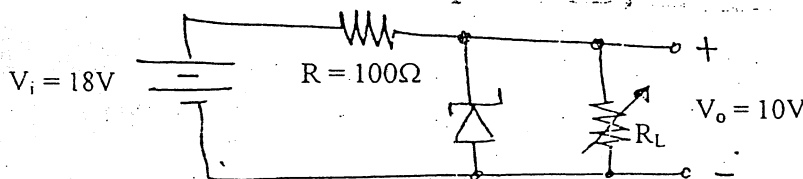
Assume $V_Z = 10V$.

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]
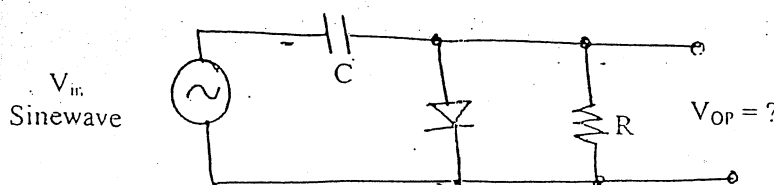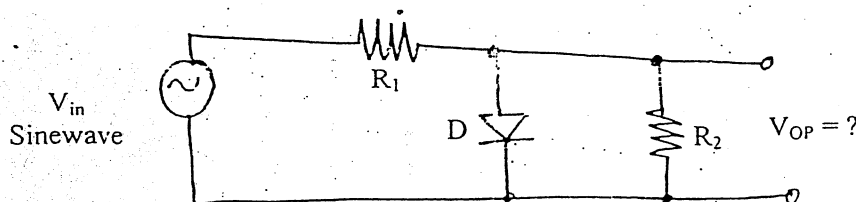
4. a) Draw basic differential amplifier circuit and indicate its input and output voltage waveforms. [2]

   b) Describe the operation of CMOS NOT-gate circuit. [4]

   c) Find R_B and R_C in the given circuit. Given data are: $I_C = 1.2mA$, $V_{CE} = 6V$ and $\beta=100$. [4]
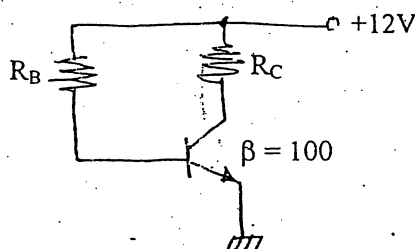
5. a) State six important properties of ideal opamp. [3]

   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 electro magnetic 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) [2×4]

   a) Graphical analysis of diode circuit   b) Shift register and counter
   c) E-MOSFET

***