TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division

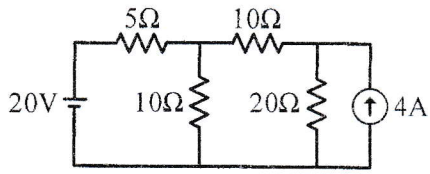
2080 Chaitra

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.

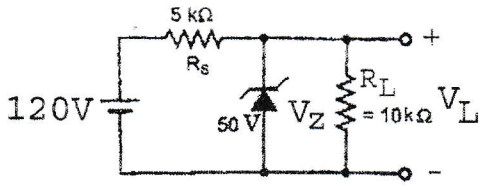
Subject: - Basic Electronics Engineering *(EX 451)*

- ✓ 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. Explain the operation of RC low pass filter. [4]
2. Use superposition theorem to find current through 20Ω resistor. [4]



3. Explain I-V characteristics of PN junction diode and Derive the following: $V_{D2} - V_{D1} = 2.3\ \eta\ V_T \log(\frac{I_{D2}}{I_{D1}})$. [4]
4. For the circuit shown in figure, find (i) the output voltage (ii) the voltage drop across Rs and (iii) the current through Zener. [4]



5. Draw the DC load line and determine the Q-point of the voltage divider biased transistor circuit having $V_{CC} = 15$ V, $R_C = 1$ kΩ, $R_1 = 10$ kΩ, $R_2 = 5$ kΩ, $R_E = 2$kΩ and $\beta = 75$. [6]
6. Explain the operation of a bipolar junction transistor as a switch. [4]
7. Describe the construction and working principle of n-channel depletion type MOSFET with necessary diagrams. [6]
8. What do you mean by virtual ground in op-amp? Draw the circuit diagram of the inverting integrator and show that the output is proportional to the time integral of the input. [2+4]
9. Describe the operation of a square wave generator using op-amp and find its frequency of oscillation. [6]
10. Design an opamp circuit to obtain $V_o = -2V_1+3V_2+4V_3$ using an opamp. Here V_1, V_2 and V_3 are the three input voltage sources. Use minimum value of resistance as 10 kΩ. [4]
11. Explain the block diagram of a digital communication system. Write down any four advantages of optical fiber communication system. [4+2]
12. Differentiate between wired and wireless communication. [2]
13. Explain the operation of a SR flip-flop with circuit diagram, truth table and characteristic table. [6]
14. Design four bit parallel adder using full adders. [4]
15. Simplify the Boolean function $F(x, y, z) = \Sigma(0, 2, 4, 5, 6)$ and realize using universal gates. [4+2]
16. Write short notes on:(Any Two) [2×4]
    a) Digital multimeter b) Regulated power supply c) Cathode ray oscilloscope

***

TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division

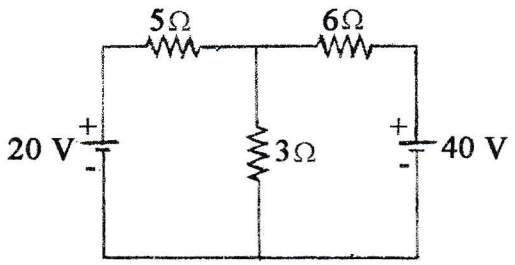
2079 Chaitra

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. Find the current through 3Ω Resistor using superposition theorem. [4]



2. What is a filter? Explain high-pass filter. [4]
3. What is PN junction diode? Explain the small signal model of the diode with necessary derivations and transfer characteristics. [2+6]
4. Draw emitter-feedback bias circuit of BJT. Find I_C and V_{CE} in the circuit if $V_{CC} = +10V$, $R_B = 400K\Omega$, $R_C = 3K\Omega$, $R_E = 2K\Omega$ and $\beta = 50$. [4]
5. Explain BJT as a switch and logic inverter. [4]
6. Explain the operation of N channel depletion type MOSFET with necessary diagram. [8]
7. What is virtual ground concept in an op-amp? Design a circuit using op-amp whose output is as follows:
   $V_0 = - V_1 + 3V_2 + 5V_3$ [1+3]
8. Design a Wein bridge oscillator that will oscillate at 25KHz. [4]
9. Mention any four characteristics of an ideal op-amp. Derive an expression for output voltage of an integrator circuit using op-amp. [2+4]
10. Explain the working a digital Multimeter with necessary block diagram. [5]
11. Draw the block diagram of optical fiber communication system. What are the advantages of optical fiber communication system? [6]
12. Explain the working of data logger. [5]
13. Perform the following conversions: [2]
    a) $(B2C.B)_{16} = (?)_8$
    b) $(211)x = (152)_8$. Find the value of x.
14. Design X-OR gate using only NAND gates. [4]
15. Explain the operation of SR flip-flop with necessary diagram and truth table. [6]
16. Design a 3 bit up Asynchronous counter and explain its working with necessary waveforms. [6]

***

TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division

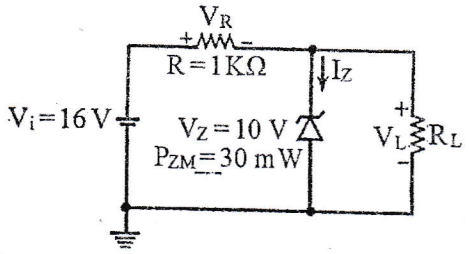
2078 Chaitra

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.

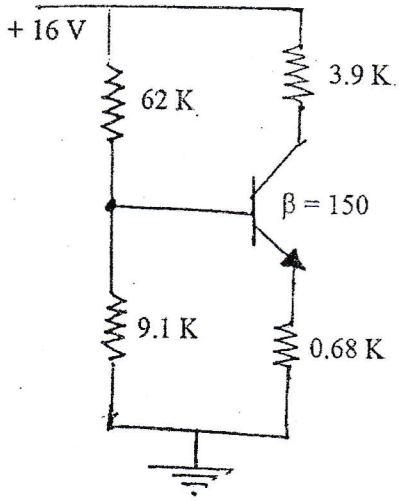
Subject: - Basic Electronics Engineering *(EX 451)*

- ✓ 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 $R_L = 3\ K\Omega$. [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

***

TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division

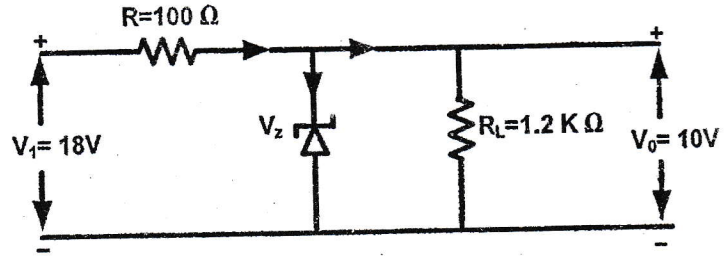
2077 Chaitra

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.

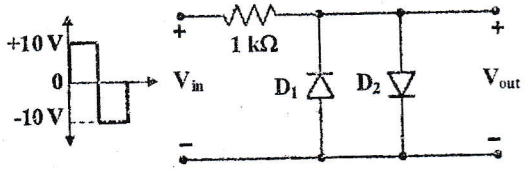
Subject: - Basic Electronics Engineering *(EX 451)*

- ✓ 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.*

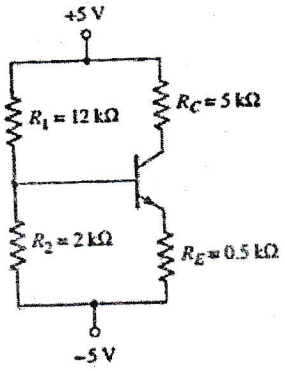
1. Write the color coding of the following values of resistors: [4]
   a) 47 ± 5% k Ω b) 548 ± 10%Ω
2. Explain RC low pass filter with necessary derivations and diagrams. [4]
3. Find the Zener Current in the given circuit when R_L = 1.2 kΩ. Assume V_Z = 10V. [4]



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 β = 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]

***

TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division

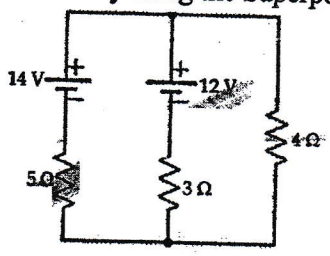
2076 Bhadra

Exam.	Regular / Back		
Level	BE	Full Marks	80
Programme	ALL Except BEI, BAR	Pass Marks	32
Year / Part	I / II	Time	3 hrs.

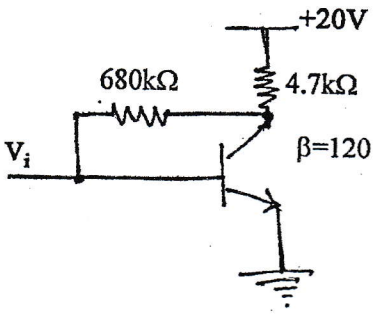
Subject: - Basic Electronics Engineering *(EX 451)*

- ✓ 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. What is filter? Explain High Pass Filter. [1+3]
2. Find the voltage across the 4Ω resistor by using the Superposition theorem. [6]



3. Explain the operation of photo diode. Draw the circuit diagram of fullwave bridge rectifier. [4+2]
4. Show the relationship between current gain alpha (α) and beta (β) of BJT. Explain the importance of dc loadline analysis in transistor biasing to find collector current & collector emitter voltage. [2+3]
5. Differentiate between depletion and enhancement type MOSFET. Explain NMOS as a switch. [2+4]
6. Determine I_{CQ} and V_{CEQ} for the following circuit. [5]



7. Explain how square wave is generated at output terminal using Op-Amp circuit as square wave generator and draw the circuit diagram of triangular wave generator. [4+2]
8. Show the concept of positive feedback with suitable block diagram. Draw the circuit diagram of Wein Bridge Oscillator using Op-amp. [3+2]
9. Design a summer circuit using op amp as: $V_o=-5V_1-10V_2-15V_3$

   Where, V_o is an output voltage and V_1, V_2 & V_3 are input voltages. [5]
10. Differentiate between internet and intranet. How Light-propagates through Optical fiber? [2+3]

11. Why modulation is needed? Differentiate AM and FM. [2+3]

12. Differentiate between SR and JK filp-flop. Explain Master-Slave flip-flop with block diagram. [1+3]

13. Simplify using Boolean Algebra. [3×2]

    a) $AC+ABC+\overline{A}(C+A\overline{C})$

    b) $(A+B)(\overline{A}+B)(A+\overline{B})$

    c) Subtract $(20)_{10}$ form $(3)_{10}$ using 1's complement method

14. Simplify the function using K-map:
    $F(D,C,B,A)=\Sigma(3,4,5,7,9,13,14,15)$ and realize this circuit using gates. [6]

15. Write short notes on: ***(Any Two)*** [3×2]

    a) Data logger

    b) Regulated power supply

    c) Transducer

***

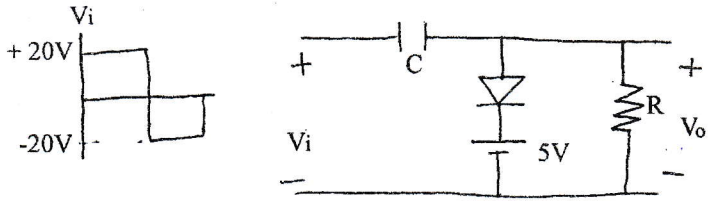
04 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2076 Baisakh

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

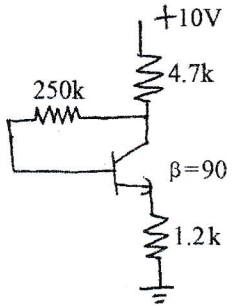
Subject: - Basic Electronics Engineering *(EX 451)*

- ✓ 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]
    a) Strain Gauge
    b) Regulated Power Supply

***

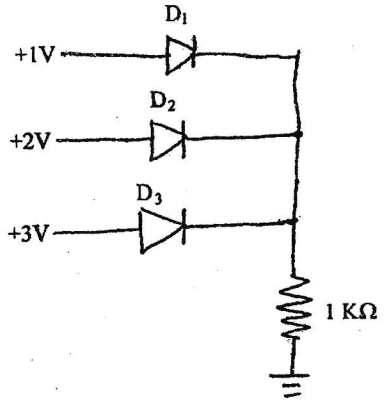
04 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2075 Bhadra

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]

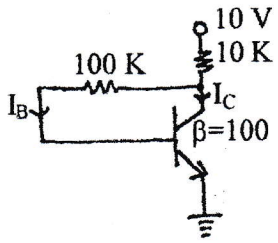
    a) $(EIA)_{16} = (\ )_8$ b) $(35.7)_{10} = (\ )_2$
11. State and prove De-Morgan's Theorems. [3]
12. Define encoder. Explain the operation of octal to binary encoder with logical diagram. [6]

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]

***

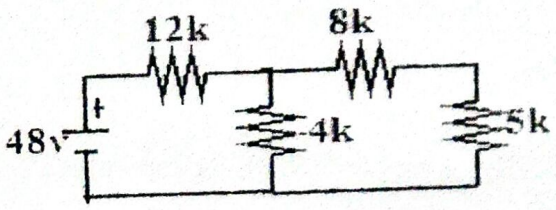
04 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2075 Baishakh

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]

***

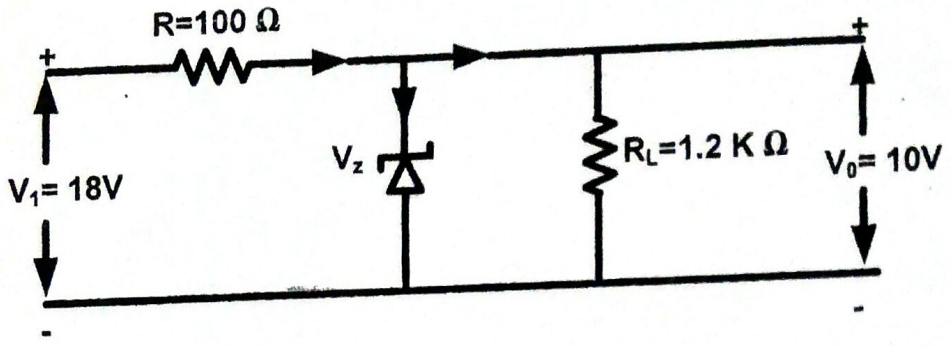
04 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2074 Bhadra

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 $R_L = 1.2\ K\Omega$. 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 $V_{CC} = +12\ V$, $R_B = 430\ k\Omega$, $R_C = 2\ k\Omega$, $R_E = 1\ k\ \Omega$ and $\beta = 50$. [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]
16. Explain the operation of clocked R-S Flip-Flop with necessary diagram. [6]

***

04 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2073 Bhadra

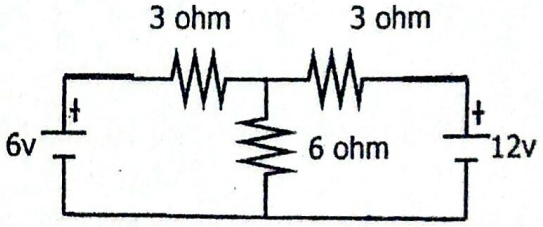
96+66

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
    c) Regulated power supply

***

04 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2073 Magh

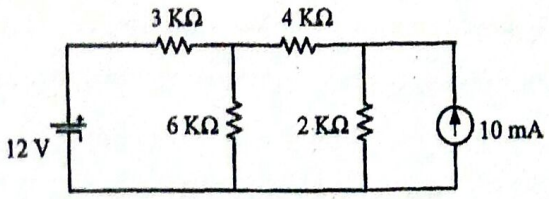
96+66

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.

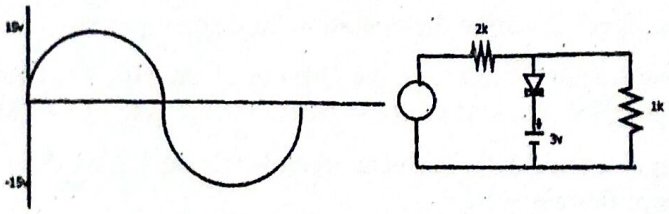
Subject: - Basic Electronics Engineering *(EX451)*

- ✓ 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. State Thevenin's theorem and use it to find the current through 4 kΩ resistor. [1+5]



2. Explain the operation of RC low pass filter with its transfer function and frequency response. [4]
3. What is diode? Explain the I-V characteristics of PN junction diode. [1+4]
4. Define pulse shaping circuits. Find the output wave form of the given circuit. [1+4]



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} = +12V, R_B = 430 kΩ, R_C = 2 kΩ, R_E = 1 kΩ and β = 50. [2+3]
6. Draw the structure of CMOS. Describe the operation of CMOS logic inverter. [5]
7. Explain the concept of virtual ground. Design a summer circuit using op-amp to get the output voltage as: $V_0 = -(V_1+10V_2+25V_3)$ [1+4]
8. Define positive feedback. Draw the circuit diagram for Wien Bridge oscillator and explain the principal of operation. [1+4]
9. Draw a block diagram of communication system and explain each block briefly. [6]
10. Write short note on optical fiber. What are the advantages of optical fiber communication over traditional communication system? [2+2]
11. State and prove De-Morgan's theorems. [4]
12. Explain the operation of SR flip-flop with necessary diagram. [5]
13. Convert the following number system. [3]

    (a) $(25.5)_{10} = (?)_2$ (b) $(EAB)_{16} = (?)_{10}$ (c) $(9180)_{10} = (?)_{BCD}$

14. Write short notes on: (any two) [2×5]
    a) Strain Gauge
    b) Data Logger
    c) DMM
15. Describe the construction and working principal of N-channel Depletion type MOSFET. [8]

***

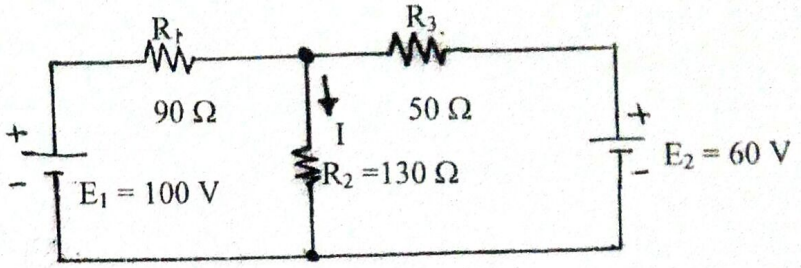
04 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2072 Magh

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. Describe the principle of Thevenins theorem by solving the following problem. [4]



Find the current through R_2.

2. Draw the circuit diagram of RC high pass filter and explain its operation with the help of frequency dependent response at the output. [1+3]
3. Draw and explain the operation of the full-wave rectifier circuit using center tapped transformer. [4]
4. Explain the piece wise linear models of PN junction diode. [4]
5. What is a clamper circuit? Draw the clamper circuit that adds +5volts DC level on AC voltage. [1+3]
6. Draw collector feedback type dc biasing circuit. If Vcc = 10V, R_B = 950 KΩ, R_C = 2.2 KΩ and β = 150, Calculate dc operating collector current (IcQ) [4]
7. Describe the construction and working principle of n-channel Enhancement type MOSFET. [6]
8. Draw the circuit diagram of differential amplifier using BJT and sketch the waveform at the collector terminals for sinusoidal differential input. [4]
9. State four important properties of ideal operational amplifier and determine the voltage gain of non-inverting operational amplifier circuit. [2+4]
10. Draw circuit diagram of triangular wave generator with square wave a input signal. Explain the working principle of square wave generator circuit using operational amplifier. [2+4]
11. Define communication system. Draw and explain the block diagram of communication system. [2+4]
12. Subtract $(1111)_2$ from $(1100)_2$ using 2's complement method. [2]
13. State De Morgan's theorem and Duality theorem with two examples for each. [4]
14. Simplify the following expression: [3+3]

    i) $F(x,y,z) = xyz + x'y'z + xy'z' + x'y'z' + x'yz$
    ii) $F(x,y,z) = \sum (0,2,5,6)$

15. Write short notes on: [4×4]
    a) Oscilloscope
    b) Digital voltmeter
    c) Positive and negative feedbacks
    d) Varactor diode

***

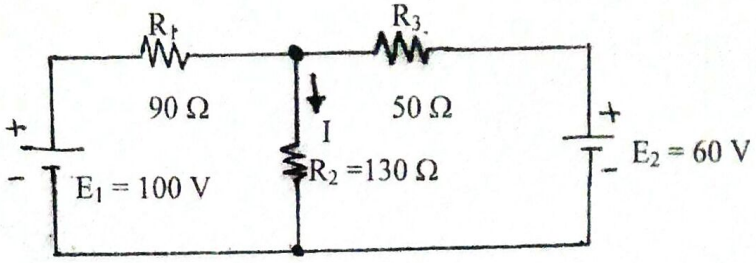
04 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2072 Magh

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. Describe the principle of Thevenins theorem by solving the following problem. [4]



Find the current through R_2.

2. Draw the circuit diagram of RC high pass filter and explain its operation with the help of frequency dependent response at the output. [1+3]
3. Draw and explain the operation of the full-wave rectifier circuit using center tapped transformer. [4]
4. Explain the piece wise linear models of PN junction diode. [4]
5. What is a clamper circuit? Draw the clamper circuit that adds +5volts DC level on AC voltage. [1+3]
6. Draw collector feedback type dc biasing circuit. If Vcc = 10V, R_B = 950 KΩ, R_C = 2.2 KΩ and β = 150, Calculate dc operating collector current (IcQ) [4]
7. Describe the construction and working principle of n-channel Enhancement type MOSFET. [6]
8. Draw the circuit diagram of differential amplifier using BJT and sketch the waveform at the collector terminals for sinusoidal differential input. [4]
9. State four important properties of ideal operational amplifier and determine the voltage gain of non-inverting operational amplifier circuit. [2+4]
10. Draw circuit diagram of triangular wave generator with square wave a input signal. Explain the working principle of square wave generator circuit using operational amplifier. [2+4]
11. Define communication system. Draw and explain the block diagram of communication system. [2+4]
12. Subtract $(1111)_2$ from $(1100)_2$ using 2's complement method. [2]
13. State De Morgan's theorem and Duality theorem with two examples for each. [4]
14. Simplify the following expression: [3+3]
    i) $F(x,y,z) = xyz + x'y'z + xy'z' + x'y'z' + x'yz$
    ii) $F(x,y,z) = \sum (0,2,5,6)$
15. Write short notes on: [4×4]
    a) Oscilloscope
    b) Digital voltmeter
    c) Positive and negative feedbacks
    d) Varactor diode

---

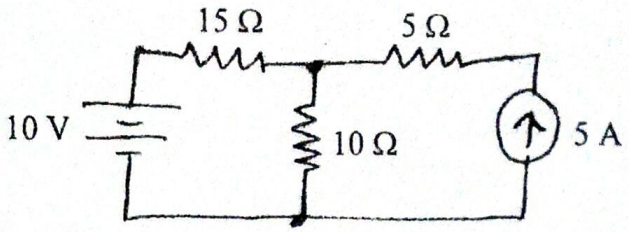
04 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Bhadra

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

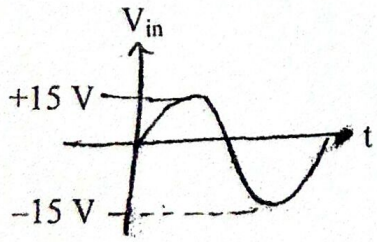
Subject: - Basic Electronics Engineering *(EX451)*

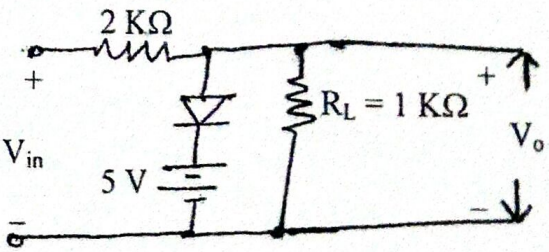
- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Define active and passive circuit component. Determine the color code of the following resistor 75 KΩ ± 10%. [2+2]
2. Determine the current through 10 Ω resistance using Thevenin's theorem. [4]

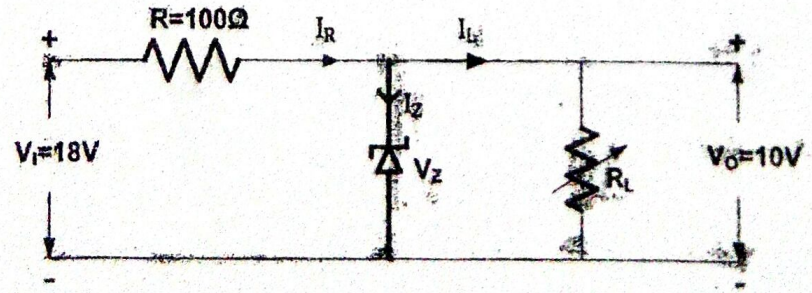


3. What is a filter? Explain the types of filter with necessary diagrams. [1+3]
4. Explain large signal models of PN junction diode. [4]
5. Define clipping circuits. Draw the output waveform of circuit shown below. Assume real silicon diode. [2+2]





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

***

24

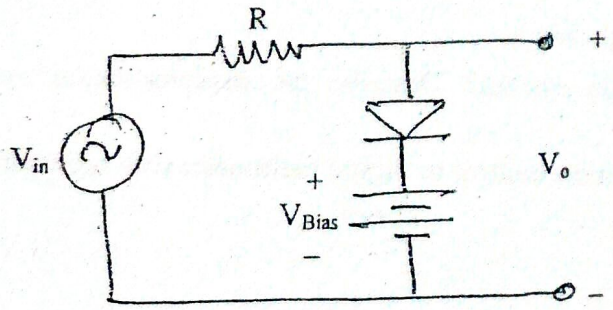
TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Magh

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.

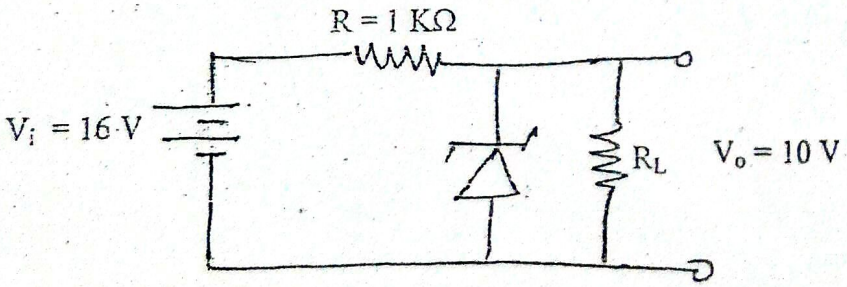
Subject: - Basic Electronics Engineering *(EX451)*

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

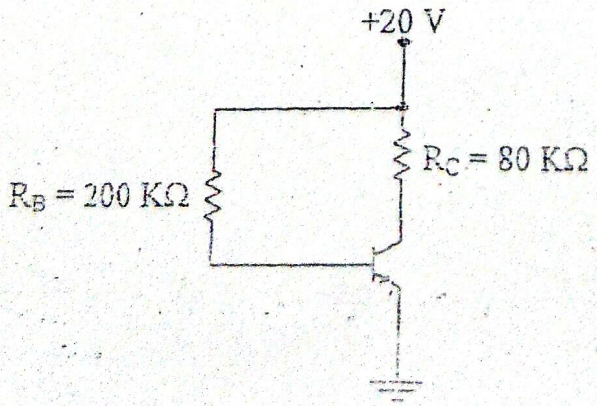
1. What do you mean by filter? Explain the RC low pass and high pass filter with corresponding transfer function and magnitude. [1+4]
2. State Thevenin's Theorem. Write down the steps for determining V_{th} and R_{th} with necessary circuit diagrams. [1+4]
3. What is rectification? Explain the operation 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 β = 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]

***

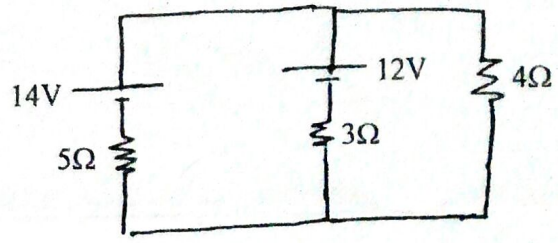
04 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2070 Bhadra

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

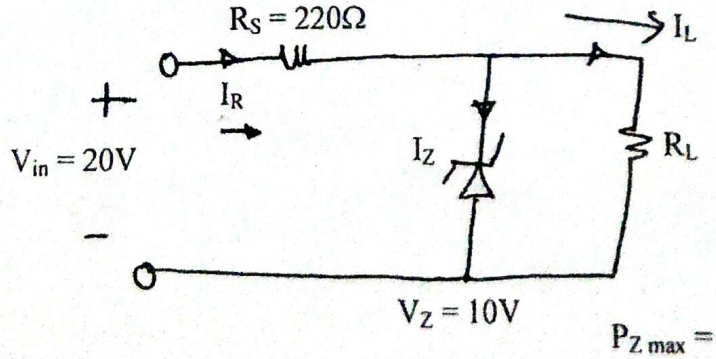
Subject: - Basic Electronics Engineering ***(EX451)***

- ✓ 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]

    $42_{(10)} - 115_{(10)}$ [4]

12. Simplify the expression using k-map

    $F(x, y, z) = xyz + x'y'z + xy'z' + x'y'z' + x'yz$ [4]

13. Discuss the operation of S-R flip flop. [5×2]

14. Write short notes: (any two)

    a) Clipper circuit
    b) Strain gauge transducer
    c) Data logger

***

(38)

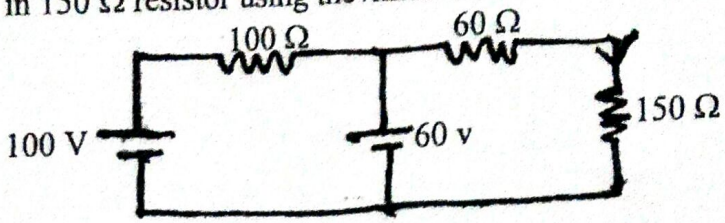
04 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2070 Magh

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.

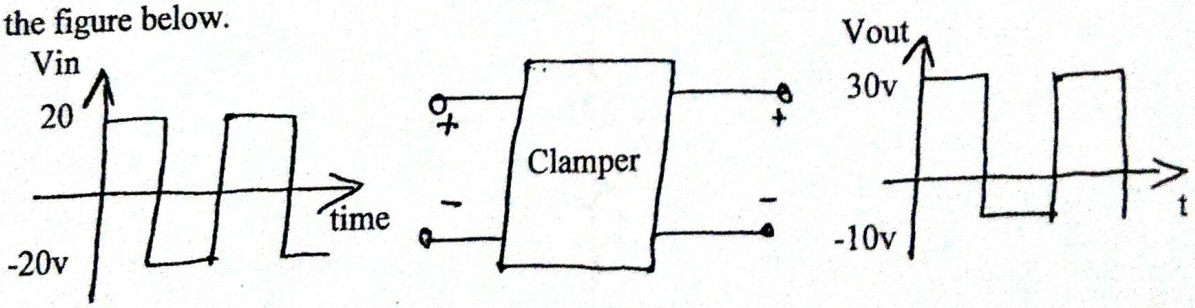
Subject: - Basic Electronics Engineering *(EX451)*

- ✓ 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.*

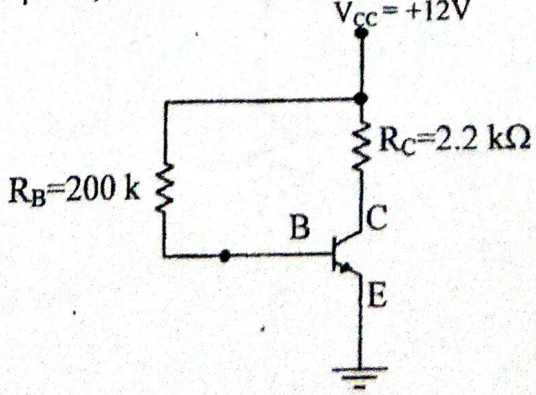
1. Find the current I in 150 Ω resistor using thevinius theorem. [6]



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. $F(A, B, C) = \Sigma (0, 1, 2, 5) + D (3, 4, 6)$ 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

***

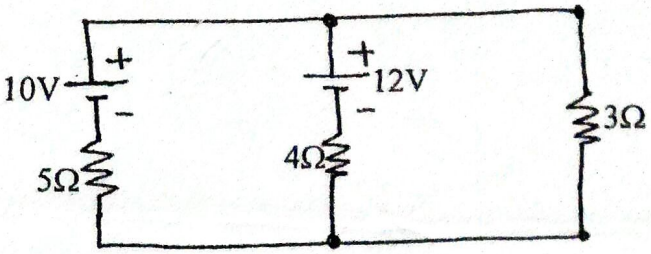
04 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2069 Bhadra

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.

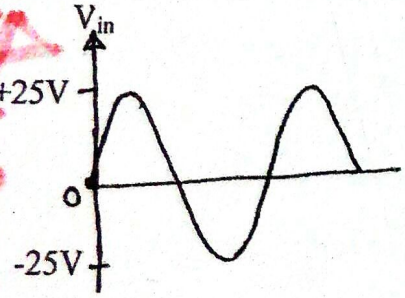
Subject: - Basic Electronics Engineering ***(EX451)***

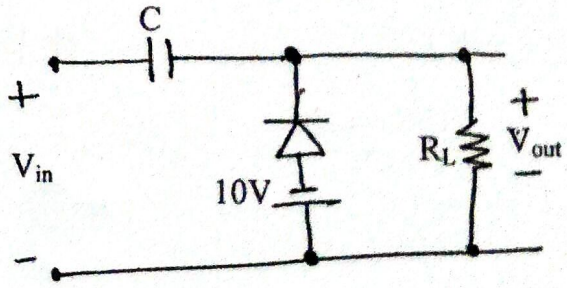
- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

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]

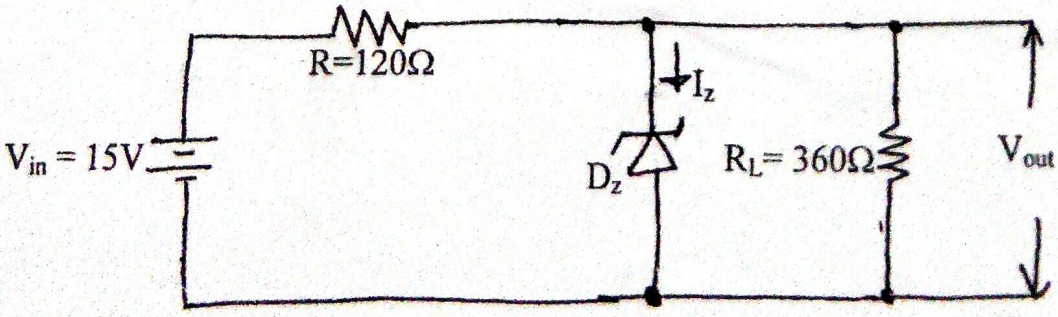


4. What is clamping circuit? Find the output waveform of the given circuit. [1+3]





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]

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]

***

04 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division

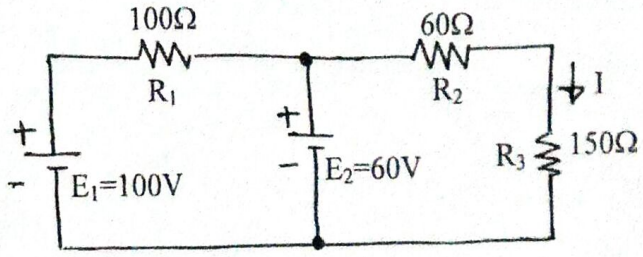
2069 Poush

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 R_3 using Thevenin's theorem. [4]



2. Draw the circuit diagram of RC Low Pass Filter and explain with the help of frequency dependent response of the output. [4]
3. What is diode? Explain the I-V characteristics of PN junction diode. [6]
4. Explain the working principle of full-wave bridge rectifier circuit. [6]
5. What is dc load line curve? Explain the common emitter configuration circuit with the help of input and output characteristic curve. [1+5]
6. Explain the construction and working principle of MOSFET. [6]
7. State four important properties of ideal operational amplifier. Draw the circuit diagram of an integrator using op-amp and show that output is the integration of input signal. [2+4]
8. Explain the working principle of square wave oscillator circuit using op-amp. [6]
9. Define communication system. Discuss about the merits of optical fiber communication over the other transmission media. [2+4]
10. Simplify the expression using K-Map, F(x,y,z) = x'yz + x'y'z + xyz and realize it using logic gates. [2+2]
11. Mention various types of flip flops and discuss about the J-K flip flop with the help of logic diagram. [2+4]
12. Perform the following: [1×4]
    a) $(122)_{10} = (?)_{BCD}$
    b) $(423.25)_8 = (?)_2$
    c) $(179.03125)_{10} = (?)_2$
    d) Subtract $(25)_{10}$ from $(49)_{10}$ using 2'S complement method
13. Write short notes on: (any four) [4×4]
    a) Data logger
    b) Internet / Intranet
    c) Clipper circuit
    d) Strain Gauge Transducer
    e) Instrumentation system

***

(18)

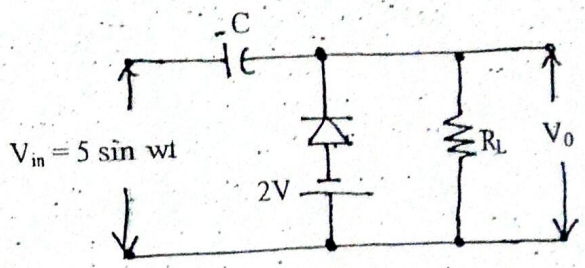
04 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2068 Bhadra

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

***

04 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division

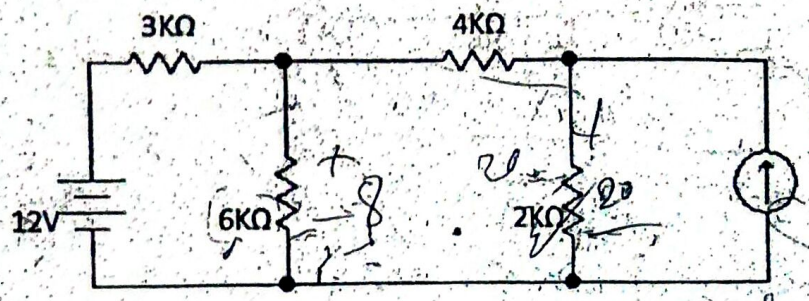
2068 Magh

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

- ✓ 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 Thevenin's theorem and use it to find the current through 4KΩ resistor. [2+6]



2. Explain large signal model of PN junction diode. [6]
3. Explain the working principle of half wave rectifier with necessary diagrams. [6]
4. Explain any two DC-biasing methods of BJT with necessary derivations and diagrams. [8]
5. Why BJT is bipolar and MOSFET is a unipolar device? Draw the circuit diagram of NOT gate using CMOS. [2+2]
6. Mention any five properties of IDEAL Op-Amp. Draw the circuit diagram and explain the operation of square wave generator using Op-Amp. [2+4]
7. Find the voltage gain of non inverting Op-Amp. [4]
8. Briefly describe about the block diagram of communication system. [5]
9. What do you mean by electromagnetic waves? How are they propagated? Explain. [2+3]
10. Simplify the expression using K-Map, F(A, B, C) = A'B + BC' + AC'. [3]
11. What is multiplexer (MUX)? Explain 4:1 multiplexer. [3]
12. Perform the followings: [1.5×4]
    a) $(903)_{10} = (?)_{BCD}$
    b) $(624.03)_8 = (?)_{16}$
    c) $(101101)_2 + (10111)_2 = ?$
    d) Subtract using 2's complement : $(14)_{10} - (11)_{10}$
13. Write short notes on: (any four) [4×4]
    a) Regulated Power Supply
    b) Application circuit of strain gauge
    c) Comparison of digital and analog instruments
    d) Data logger
    e) Light Emitting Diode (LED)
    f) Diode Clamper Circuit

***

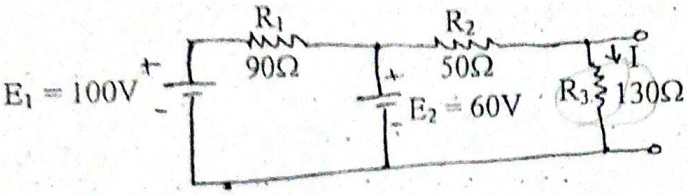
04 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2067 Mangsir

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) $\bar{A}\,\bar{B}\,\bar{C} + \bar{A}\,\bar{B}\,C + A\,\bar{B}\,\bar{C} + A\,\bar{B}\,C$

ii) $A\bar{C} + ABC + A(C + A\bar{C})$

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

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

***

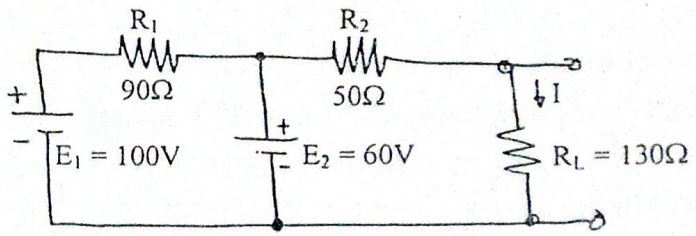
02 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2067 Chaitra

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]

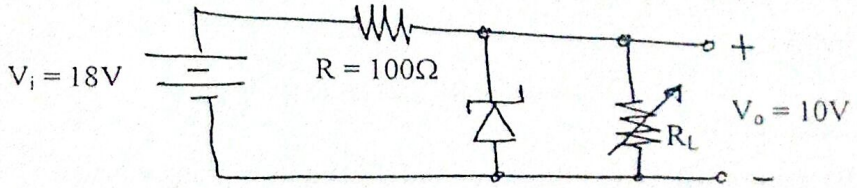


Find current I through R_L.

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]

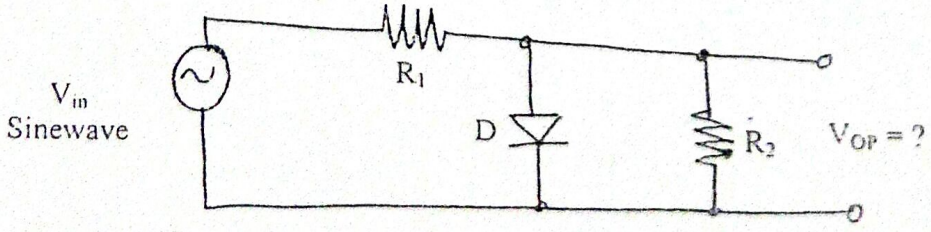
b) Find zener current in the given circuit when $R_L = 1.2k\Omega$. [3]

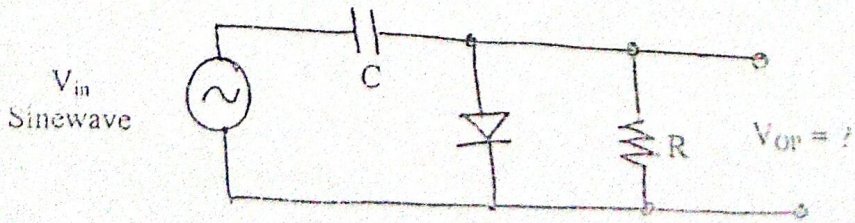


Assume $V_Z = 10V$.

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]

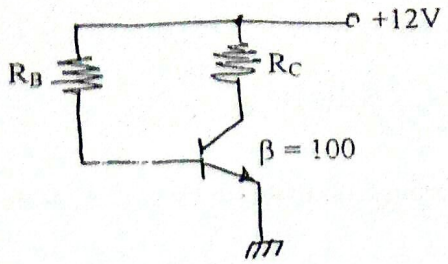




4. a) Draw basic differential amplifier circuit and indicate its input and output voltage waveforms. [2]

   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

***

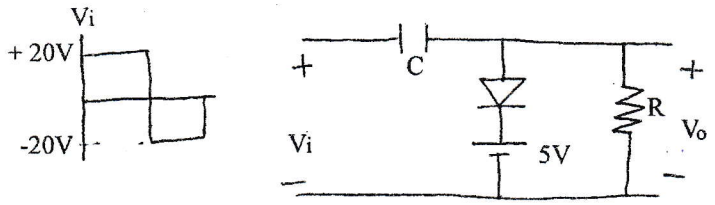
04 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2076 Baisakh

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

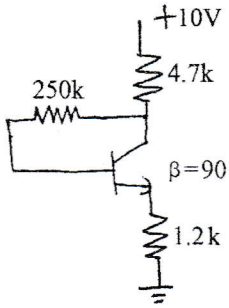
Subject: - Basic Electronics Engineering *(EX 451)*

- ✓ 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]
    a) Strain Gauge
    b) Regulated Power Supply

***