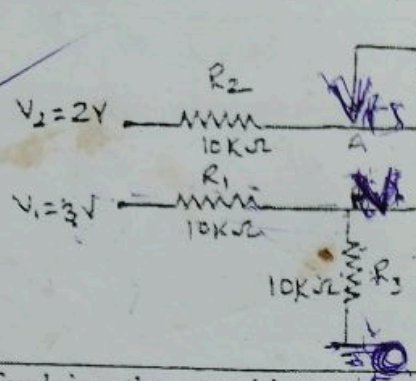
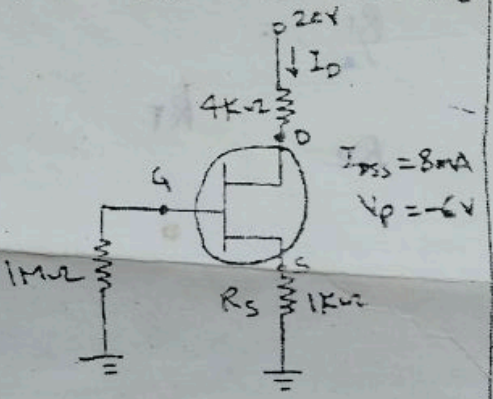
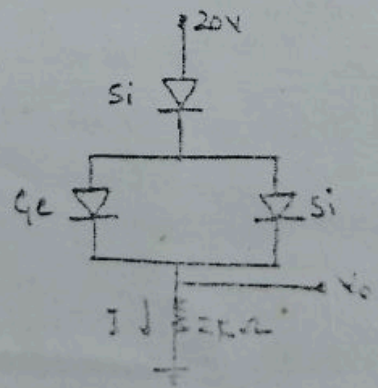
	Find the expression for the output of inverting OP-Amp. Find the output voltage of the following circuit  $V_o = \left(\frac{R_f}{R_1}\right)V_{in} + \left(1+\frac{R_f}{R_1}\right)\left(\frac{R_3}{R_1+R_3}\right)V_2$	CO2	6
	Explain the working of n-channel JFET. Determine I_{DSQ} and V_{DSQ} for the following circuit.  	CO2	6
	SECTION 'C'	**Course Objective**	**Marks**
	Q.N.3. Attempt any two parts of the following:		
	Explain the working of pn junction diode in forward bias condition. Determine V_o for the following circuit. Also Find I.  	CO1	5

4. (a) Convert the following bases :

(i) $(11011.011)_{2} \longrightarrow (\quad)_{16}$

(ii) $(2AC9)_{16} \longrightarrow (\quad)_{8}$

(b) Minimize the following using K-map :

$f = \Sigma m\,(1, 2, 5, 7, 9, 15) + \phi\,\Sigma m\,(0, 3, 4, 6)$ 6.

(c) Simplify the Boolean expression :

$$Y = \bar{A}B\bar{C}D + AB\bar{C}D + \bar{A}BCD + ABCD + \bar{A}\bar{B}\bar{C}\bar{D}$$

using four variable K-map.

5. (a) Explain the working of PN junction diode in open circuit, forward biased and reverse biased mode with suitable diagram.

(b) Write a short note on the following :

(i) LED

(ii) LCD

(iii) Solar cell

(c) Explain how zener diode work as a shunt regulator. Determine the range of values of V_i that will maintain the zener diode of figure-2 in ON state :

Name: Student University Roll No.:	Printed Pages:2

School of Engineering

Second Sessional Examination, Odd Semester (AS: 2022-23)

B. Tech: CSE Year: 1st Semester: 1st

Course Title: Basic Electronics Engineering Course Code: BEC3101	Max Marks: 60 Time: 3hrs

Instructions: Read the question Carefully.

	SECTION 'A' Q.N.1. Attempt all parts of the following:	Course Objective	Marks
a)	What is the PIV of the diode used in Half wave rectifier?	CO1	1
b)	Write down the diode current equation.	CO1	1
c)	Write down the biasing condition of a BJT for active and saturation mode operation.	CO1	1
d)	What is the function of SiO_2 layer in MOSFET?	CO2	1
e)	Write down the truth table for X-OR and X-NOR gate.	CO3	1
f)	State Demorgan's Theorem.	CO3	1
g)	For an OP-amp if $A_d = 5x10^5$ and $A_c = 50$. Find CMRR.	CO2	1
h)	Draw the circuit diagram of differentiator and Integrator.	CO2	1

	SECTION 'B' Q.N.2. Attempt any two parts of the following:	Course Objective	Marks
a)	A bridge rectifier circuit with R_L=200KΩ is given an input of 230V, 50Hz from power mains through a transformer having turns ratio 8:1. Calculate I_{dc}, I_{rms}, ripple factor, P_{dc}, P_{ac} and rectification efficiency. Neglect the diode and secondary winding resistance.	CO1	6
b)	Perform the following conversion. (i) $(32.125)_{10} = (\ ?\ )_2$ (ii) $(47.62)_8 = (\ ?\ )_{10}$ (iii) $(A1F2C.DE6)_{16} = (\ ?\ )_2$ (iv) $(536.215)_8 = (\ ?\ )_{16}$ (v) $(1011011.00110101)_2 = (\ ?\ )_8$	CO3	6

(c) What do you mean by modulation? What is the need of modulation? Explain the amplitude modulation and compare it with frequency modulation.

(d) Explain inverting OP-amp with feedback. Obtain an equation for voltage gain with feedback. Design a non-inverting amplifier circuit that is capable of providing a voltage gain of 10. Assume an ideal operational amplifier.

SECTION – C

Note :– Attempt all questions. Attempt any two parts from each question. 4×10=40

3. (a) Sketch the circuit of summer using OP-amp to get :

$$V_0 = -[-V_1 + 2V_2 - 3V_3]$$

(b) Draw the circuit diagram of an OP-amp integrator and also show that the output voltage in an integration of input voltage.

(c) Define CMRR of a differential amplifier. A differential amplifier has a typical common mode gain of 35 dB and CMRR of 72 dB. Find the output voltage V_0 when the input voltages are of 0.16 mV and 0.18 mV.

(e) Differentiate among conductors, insulators and semi-conductors using energy band concept.

(f) Draw the block diagram of communication system.

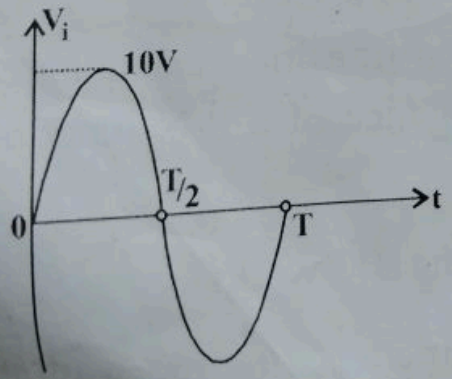
(g) Define the pinch off condition.

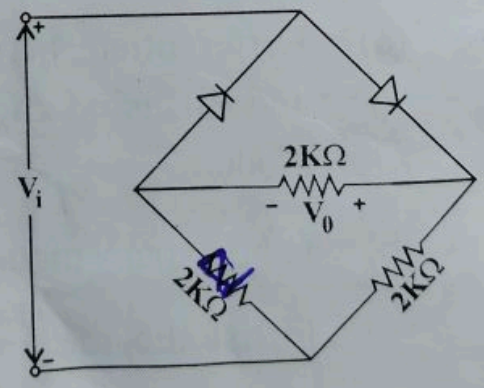
(h) Explain the concept of virtual ground.

SECTION – B

2. Attempt any two parts of the following : 2×6=12

(a) Explain the working of full wave bridge rectifier. Find the values of PIV of each diode. Determine the output waveform for the network of figure-1 and also calculate the output D. C. level :





(b) When n p n is preferred over p n p transistor? Explain the working and construction of n p n transistor.

S.No. : 713 BEC 3101

No. of Printed Pages : 06

Following Paper ID and Roll No. to be filled in your Answer Book.

PAPER ID : 33401 Roll No.

B. Tech. Examination 2022-23

(Odd Semester)

BASIC ELECTRONICS ENGINEERING

Time : Three Hours] *[Maximum Marks : 60*

Note :– Attempt all questions.

SECTION – A

1. Attempt all parts of the following : 8×1=8

   (a) Differentiate between transition capacitance and diffusion capacitance of a P-N junction diode.

   (b) In how many modes the BJT works?

   (c) Enlist the ideal characteristics of an ideal operational amplifier.

   (d) What are universal gates and why are they so called?

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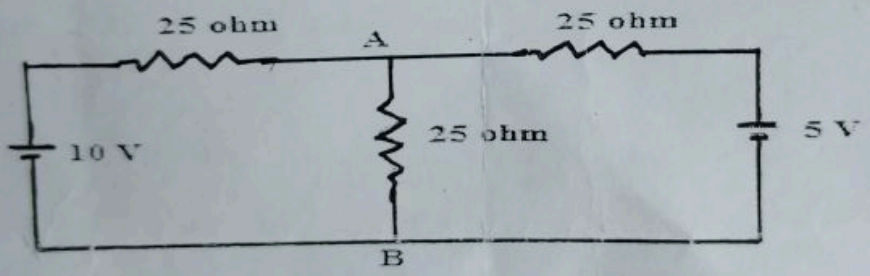
SECTION 'C'		Course Objective	Marks
Q.N.3. Attempt any one part of the following:			
a)	Explain two wattmeter method for the measurement of three phase AC power.	CO2	10
b)	Three phasors: $X = 3 + j4,\ Y = 3 + j0,\ Z = 10 \angle 60^0$ Find: $\frac{YZ}{X}$ Calculate the current in branch AB in given circuit, using Thevenin theorem.  	CO1	10
c)	Three similar coils each having a resistance of 5ohm and an inductance of 0.02H are connected in delta to a 440V, 3-phase, 400V, and 50Hz supply. Calculate the line current and total power absorbed.	CO2	10

Table 1: Mapping between COs and questions

(Number of COs may vary from course to course)

COs	Questions Numbers	Total Marks
CO1	1 (a, b, c), 2(a, b), 3(b)	28
CO2	1(d, e) 2(c, d) 3(a, c)	37

Name: Student University Roll No.:	Printed Pages:2

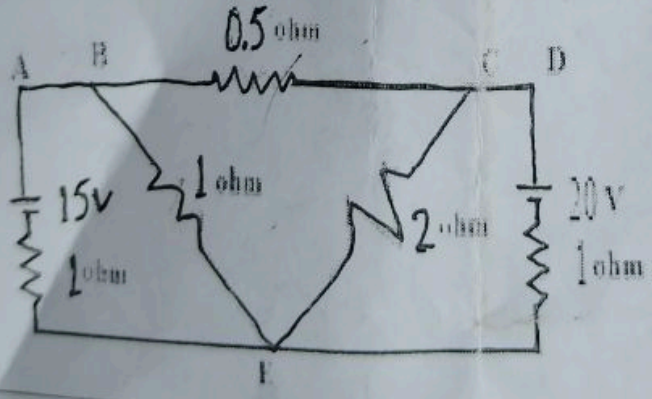
School of Engineering

First Sessional Examination, Even Semester (AS: 2022-23)

B. Tech: CS11-18 Year: 1 Semester: I

Course Title: Basic Electrical Engineering Course Code: BEE3201	Max Marks: 30 Time: 1 *hr*

Instructions if any: Read the question Carefully.

	SECTION 'A' **Q.N.1. Attempt all parts of the following:**	Course Objective	Marks
a)	What is an ideal Voltage source?	CO1	1
b)	State Tellegence's Theorem.	CO1	1
c)	Define Kirchhoff's Voltage Laws.	CO1	1
d)	Define true power in AC.	CO2	1
e)	State Bandwidth and Quality factor.	CO2	1
	SECTION 'B' **Q.N.2. Attempt any two parts of the following:**	Course Objective	Marks
a)	State and explain Maximum Power transfer theorem to solve network problems, and also write two applications.	CO1	7.5
b)	By using nodal analysis, find the total power consumed in given circuit: 	CO1	7.5
c)	Prove that the average power consumed in a pure inductive circuit is zero.	CO2	7.5
d)	Prove that **Irms** = **Im**/$\sqrt{2}$ for single phase AC circuit.	CO2	7.5

Q.N.6. Attempt any two parts of the following:

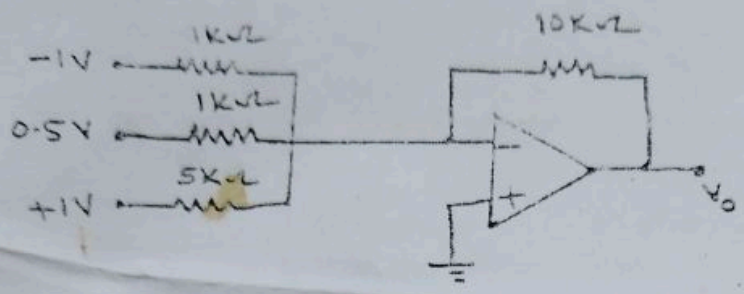
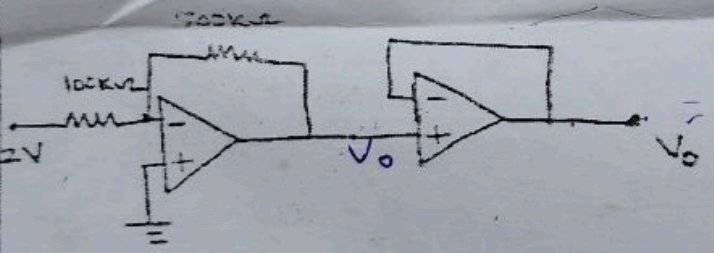
a)	Derive the output expression for the inverting summing op amp. Find the output voltage for the following network. 	CO2	5
b)	Enlist the characteristics of ideal op-amp. Derive the expression of the output of the non-inverting op amp. Find the output V_o of the following circuit. 	CO3	5
c)	Which type of feedback is used for the oscillation? Explain the principle of oscillator and describe the Bark Hausen Criterion.	CO3	5

Table 1: Mapping between COs and questions

(Number of COs may vary from course to course)

COs	Questions Numbers	Total Marks
CO1	Q1(a,b,c)Q2(a,b)Q3(a,b,c)	24
CO2	Q1(d,e,h)Q2(c,d)Q4(a,b,c)Q5(a)	14
CO3	Q1(f,g)Q2(b)Q3(d,e)Q4(d)Q5(b,c)	18

School of Engineering

Second Sessional Examination, Odd Semester (AS: 2022-23)

B. Tech: CSE Year: 1st Semester: 1st

Course Title: Basic Electronics Engineering Course Code: BEC3101	Max Marks: 60 Time: 3hrs

Instructions: Read the question Carefully.

	SECTION 'A' Q.N.1. Attempt all parts of the following:	Course Objective	Marks
a)	What is the PIV of the diode used in Half wave rectifier?	CO1	1
b)	Write down the diode current equation.	CO1	1
c)	Write down the biasing condition of a BJT for active and saturation mode operation.	CO1	1
d)	What is the function of SiO_2 layer in MOSFET?	CO2	1
e)	Write down the truth table for X-OR and X-NOR gate.	CO3	1
f)	State Demorgan's Theorem.	CO3	1
g)	For an OP-amp if $A_d = 5x10^5$ and $A_c = 50$. Find CMRR.	CO2	1
h)	Draw the circuit diagram of differentiator and Integrator.	CO2	1

	SECTION 'B' Q.N.2. Attempt any two parts of the following:	Course Objective	Marks
a)	A bridge rectifier circuit with R_L=200KΩ is given an input of 230V, 50Hz from power mains through a transformer having turns ratio 8:1. Calculate I_{dc}, I_{rms}, ripple factor, P_{dc}, P_{ac} and rectification efficiency. Neglect the diode and secondary winding resistance.	CO1	6
b)	Perform the following conversion. (i) $(32.125)_{10} = (\ ?\ )_2$ (ii) $(472.52)_8 = (\ ?\ )_{10}$ (iii) $(AB2C.De6)_{16} = (\ ?\ )_2$ (iv) $(536.215)_8 = (\ ?\ )_{16}$ (v) $(1011011.00110101)_2 = (\ )_8$ (vi) $(10110011.00101010)_2 = (\ )_{16}$	CO3	6

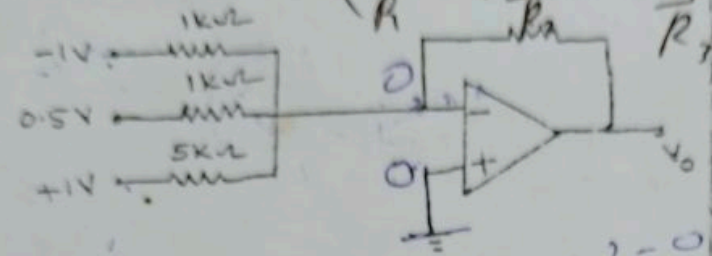
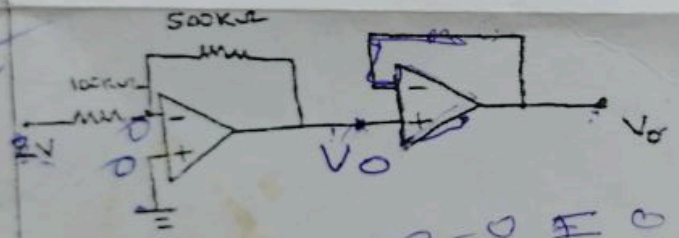
Q.N.6. Attempt any two parts of the following:			
a)	Derive the output expression for the inverting summing op amp. Find the output voltage for the following network.  $\frac{-1-0}{1} + \frac{0.5-0}{1} + \frac{1-0}{5} = \frac{0-V_0}{10}$	CO2	5
b)	Enlist the characteristics of ideal op-amp. Derive the expression of the output of the non-inverting op amp. Find the output V_0 of the following circuit.  $\frac{2-0}{100} = \frac{0-V_0}{500}$	CO3	5
c)	Which type of feedback is used for the oscillation? Explain the principle of oscillator and describe the Bark Hausen Criterion.	CO3	5

Table 1: Mapping between COs and questions

(Number of COs may vary from course to course)

COs	Questions Numbers	Total Marks
CO1	Q1(a,b,c) Q2(a) Q3(a,b,c)	24
CO2	Q1(d,e,f) Q2(c,d) Q4(a,b,c) Q6(a)	19
CO3	Q1(c,f) Q2(b) Q5(a,b,c) Q6(b,c)	17

Name:
Student University Roll No.:

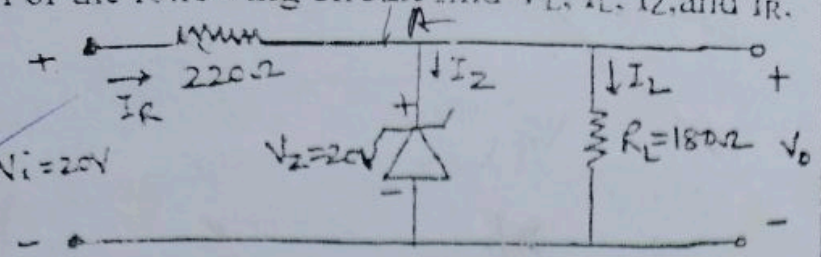
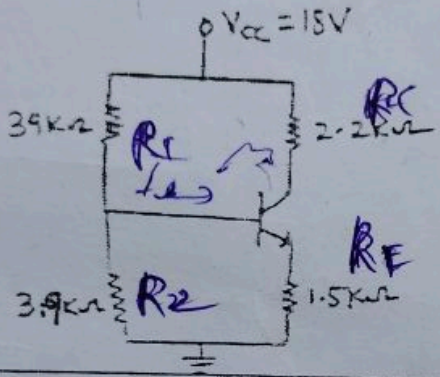
School of Engineering
Second Sessional Examination, Even Semester (AS: 2022-23)
B. Tech: All Branch [Year: First] [Semester: II]

Course Title: Differential Equations and Fourier Analysis
Course Code: BAS3201

Max Marks: 60
Time: 3hrs

Instructions if any: Read the question Carefully.

	SECTION 'A'	CO	Marks
Q.N.1. Attempt all parts of the following:			
a)	Find the order and degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^2 = \left[1+\left(\frac{dy}{dx}\right)^2\right]^3$	1	1
b)	Find the particular integral of $\frac{d^2y}{dx^2} + y = sinx$	3	1
c)	Find the values of α and β for which $3x^2 = \alpha P_2(x) + \beta P_0(x)$.	7	1
d)	Show that $x = 1$ is a singular point of $(x-1)\frac{d^2y}{dx^2} + x\frac{dy}{dx} + 2y = 0$.	7	1
e)	Write Dirichlet's conditions for a Fourier series.	8	1
f)	Find the constant term if the function $f(x) = x$ is expanded in Fourier series defined in $(-1, 1)$.	8	1
g)	Form the partial differential equation from $z = (x+a)(y+b)$ by eliminating the arbitrary constants a and b.	11	1
h)	Classify the partial differential equation $\frac{\partial^2 u}{\partial t^2} = c^2\frac{\partial^2 u}{\partial x^2}$	12	1
	SECTION 'B'	**CO**	**Marks**
Q.N.2. Attempt any two parts of the following:			
a)	Apply method of variation of parameters to solve $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = \frac{e^x}{1+e^x}$	6	6
b)	Find the power series solution of $(1-x^2)\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + 2y = 0$ about $x = 0$.	7	6
c)	Given that $f(x) = x + x^2$ for $-\pi < x < \pi$, Find the Fourier series expansion of $f(x)$. Deduce that $\frac{\pi^2}{6} = 1 + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \ldots\ldots\ldots$	8	6
d)	Find the temperature in a bar of length 2 whose ends kept at zero and		

b)	For the following circuit find V_L, I_L, I_Z, and I_R.  	CO1	5
c)	For the following voltage divider Circuit find I_{CQ} and V_{CEQ} Assume germanium transistor and $\beta = 100$.  	CO1	5

Q.N.4. Attempt any two parts of the following:

a)	With neat sketch explain the working of PNP transistor. Calculate the values of I_C and I_E for a BJT with $\alpha = 0.97$ and $I_B = 50\mu A$.	CO2	5
b)	Explain the input and output characteristics of a BJT in CE configuration.	CO2	5
c)	Explain the construction and drain characteristics of N channel E-MOSFET.	CO2	5

Q.N.5. Attempt any two parts of the following:

a)	Explain the block diagram of Communication system. What is the need for modulation?	CO3	5
b)	Perform the following subtraction using 1's and 2's complement $(42)_{10} - (32)_{10}$	CO3	5
c)	What are the universal gates? Reduce the following function using k map and implement the reduced function with NAND $F(A,B,C,D) \Sigma(0,2,4,5,6,7,8,10,11,13,15)$	CO3	5

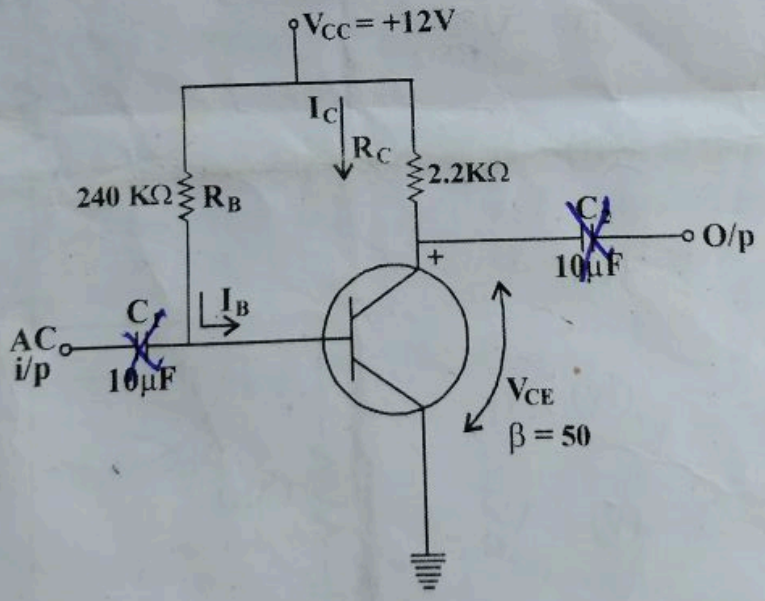
(c) Explain the working and construction of common emitter configuration and draw its input and output characteristics. Determine the fixed bias configuration of the figure-4 :

(i) I_{BQ} and I_{CQ}

(ii) V_{CEQ}

(iii) V_B and V_C

(iv) V_{BC}



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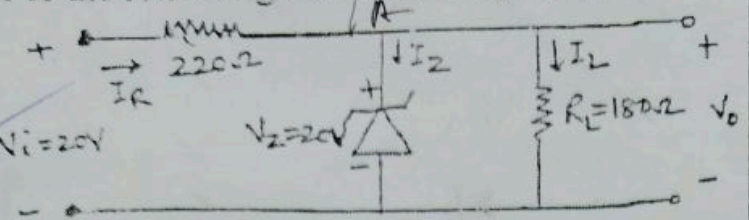
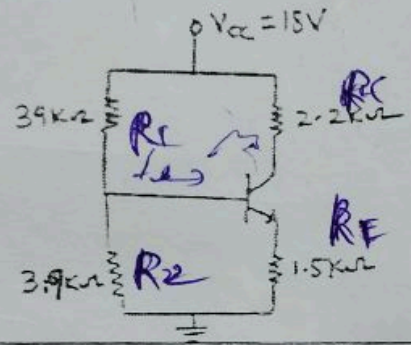
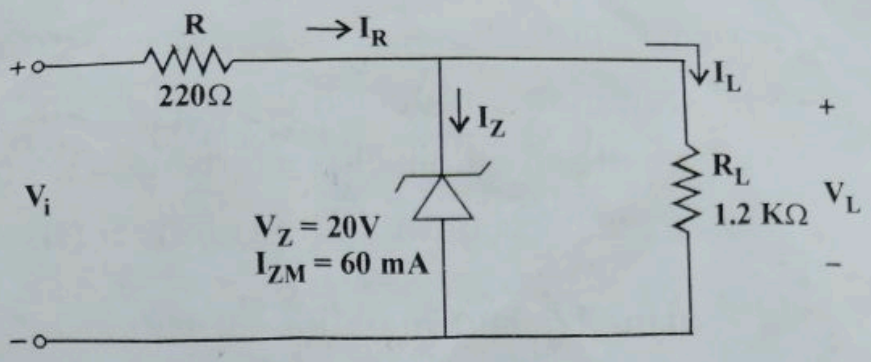
b)	Compare Zener and Avalanche breakdown mechanism. For the following circuit find V_L, I_L, I_Z and I_R.  3	CO1	5
c)	For the following voltage divider Circuit find I_{CQ} and V_{CEQ} Assume germanium transistor and $\beta = 100$.  	CO1	5
Q.N.4. Attempt any two parts of the following:			
a)	With neat sketch explain the working of PNP transistor. Calculate the values of I_C and I_E for a BJT with α= 0.97 and I_B= 50μA.	CO2	5
b)	Explain the input and output characteristics of a BJT in CE configuration.	CO2	5
c)	Explain the construction and drain characteristics of N channel E-MOSFET.	CO2	5
Q.N.5. Attempt any two parts of the following:			
a)	Explain the block diagram of Communication system. What is the need for modulation?	CO3	5
b)	Perform the following subtraction using 1's and 2's complement $(42)_{10}-(32)_{10}$	CO3	5
c)	What are the universal gates? Reduce the following function using k map and implement the reduced function with NAND $F(A,B,C,D) \Sigma(0,2,4,5,6,7,8,10,11,13,15)$	CO3	5



6. (a) Draw the structure of a JFET and explain its principle of operation with neat diagram. Also sketch its VI characteristics. Determine the following for the network of figure-3 :

(i) V_{GSQ}

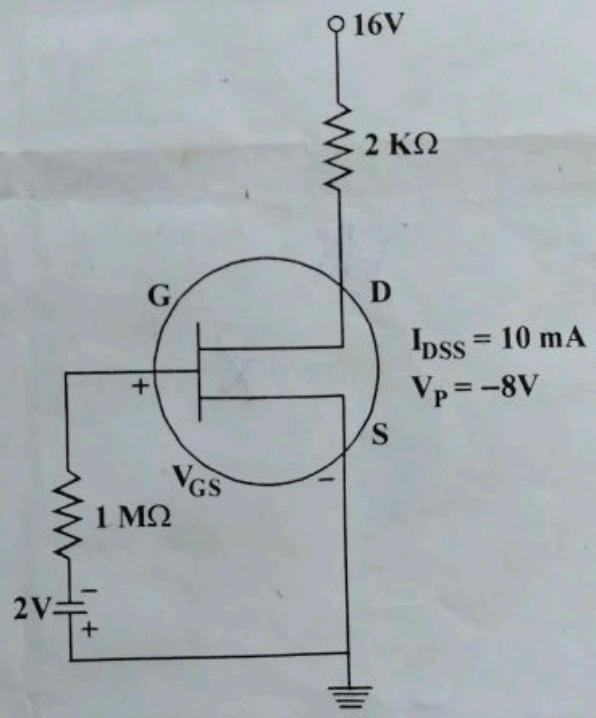
(ii) I_{DQ}

(iii) V_{DS}

(iv) V_D

(v) V_G

(vi) V_S



(b) What is MOSFET? Explain the working of n-channel enhancement type and n-channel deflection type MOSFET and compare their characteristics.