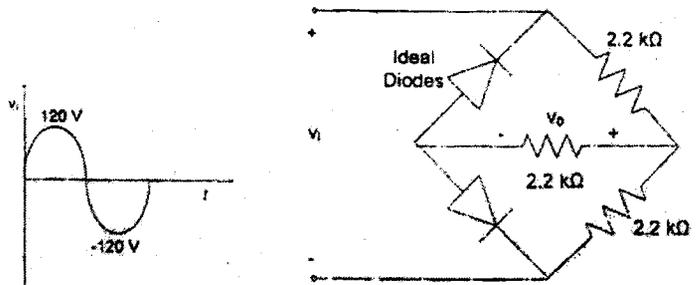


- (h) Write the input and output resistance of an ideal operational amplifier.
- (i) What are don't care conditions in digital systems ?
- (j) Write down the three major advantages of digital multimeter over analog multimeter.

SECTION—B

2. Attempt any three parts of the following. All questions carry equal marks : (10×3=30)

- (a) Draw and explain the full-wave bridge rectifier. Also derive the V_o for it. Sketch v_o for the network of Figure 1.



- (b) Draw the circuit diagram of a BJT Emitter Bias and derive the expression for Quotient Point. Write its advantage over BJT fixed bias circuit. Also define bias stabilization and stability factors.
- (c) Draw the structure of an n-channel JFET and explain its principle of operation. Also draw its drain and transfer characteristics with the help of suitable circuit. Describe how an FET can be used as a voltage controlled resistor.

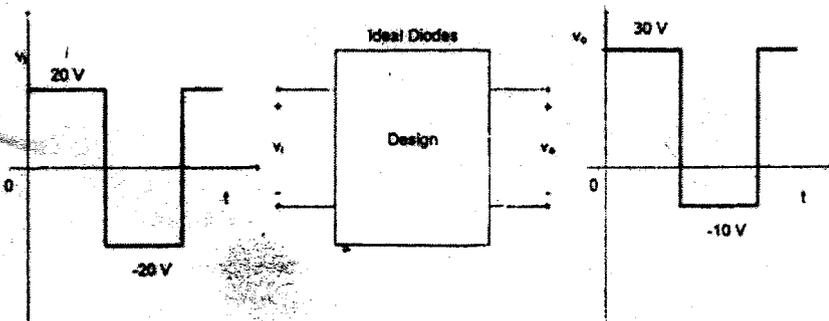
- (d) Explain the basic principle of signal display in a CRO. Also describe the method of measurement of frequency, amplitude and phase.
- (e) What are universal gates, explain with neat sketch. Minimize and realize $f = \Sigma(1, 2, 5, 7, 9, 11, 12, 14, 15)$ using one type of universal gates only.

SECTION—C

Note :— All questions are compulsory. All questions carry equal marks.

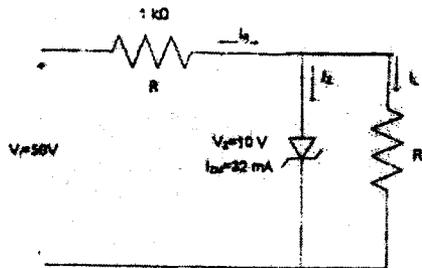
3. Attempt any two parts of the following. All questions carry equal marks : (10×5=50)

- (a) Design a clamper to perform the function indicated in Figure 2.



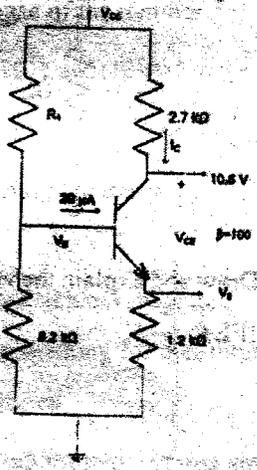
- (b) Explain the half wave voltage doubler and full wave voltage doubler with help of suitable diagrams.

- (c) For the network of Figure 3, determine the range of R_L and I_L that will result in V_{R_L} being maintained at 10 V. Also determine the maximum wattage rating of diode.



4. Attempt any two parts of the following. All questions carry equal marks :
- Explain the input and output characteristics of a BJT in the common emitter configuration. If the base current in transistor is $30 \mu\text{A}$ when the emitter current is 7.2 mA , what are the values of α and β ?
 - Draw the hybrid equivalent circuit for common base configuration and write the expression for A_v , R_i , A_o and R_o .
 - Determine the following for the voltage divider configuration shown in Figure 4 :

- (i) I_C
- (ii) V_E
- (iii) V_{CC}
- (iv) V_{CE}
- (v) V_B
- (vi) R_1

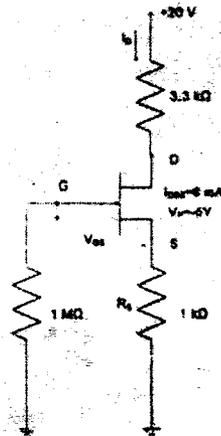


5. Attempt any two parts of the following. All questions carry equal marks :

(a) What is the significant of the threshold voltage V_T in (i) depletion mode (ii) enhancement mode MOSFETs ?

(b) Determine the following for the network of Figure 5 :

- (i) V_{GSQ}
- (ii) I_{DQ}
- (iii) V_{DS}
- (iv) V_S
- (v) V_G
- (vi) V_D



(c) Draw and explain the voltage divider bias configuration of JFET.

6. Attempt any two parts of the following. All questions carry equal marks :

(a) (i) Develop a circuit for $Y = (\bar{A} + B)CD$ Boolean expression using only NAND gates.

(ii) Develop a circuit for $Y = (A + B)C$ Boolean expression using only NAND gates.

(b) What do you mean by literal ?

Minimize the following using K-map technique :

$$f(A, B, C) = \sum m(1, 3, 6, 7) + \sum d(2, 4)$$

(c) Perform the following :

- (i) Transform the following canonical expression into its other canonical form in decimal notation :

$$f(A, B, C, D) = \pi M (0, 1, 4, 7, 9, 12, 15)$$

- (ii) Subtract by using $(r-1)$'s complement method where r is the base of the number :

$$(100110.101)_2 \text{ and } (101011.01)_2, (6552)_{10} \text{ and } (9823)_{10}$$

7. Attempt any two parts of the following. All questions carry equal marks.

- (a) Draw the functional block diagram of the digital multimeter and explain its working for measurement of AC and DC electrical quantities.
- (b) Define the horizontal and vertical sensitivity of a C.R.T.
- (c) What is unity gain buffer ? Also draw and derive the expression for integrator using operational amplifier.