SASTRA DEEMED UNIVERSITY

(A University under section 3 of the UGC Act, 1956)

End Semester Examinations

July 2022

Course Code: **EIE110**

Course: **PRINCIPLES OF ELECTRONICS**

Question Paper No. :**U1165**

Duration: **3** hours

Max. Marks:**100**

PART – A

Answer all the questions **10 x 2 = 20 Marks**

1. You have been given with an ideal PN junction diode and asked to use it as an open and closed switch. How do achieve this? Explain briefly.

2. Draw the energy band structure of Copper, Wood, and Silicon.

3. When you forward bias a silicon diode, whether the current flows through the junction immediately? Justify the reason.

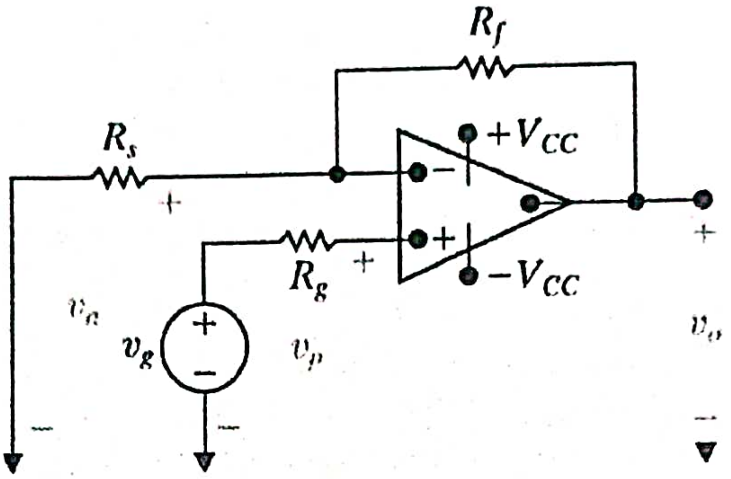
4. Compare the effect of increasing the output voltage on the input characteristics of CB and CE transistor configurations.

5. A bipolar junction transistor has a current gain of 49 when it is connected in common emitter configuration. When the base and emitter currents of this transistor are 240μA and 12mA respectively, determine the current gain when it is connected in common base configuration and also the collector current of the transistor.

6. Explain the effect of increasing the reverse bias voltage across gate to source in JFET.

7. Distinguish the DC characteristics of ideal and practical Operational amplifiers.

8. Determine the output voltage V_o for the following circuit when R_s = 1 kΩ, R_f = 100 kΩ and V_g = 1 Volt. Justify your answer.



9. Simplify the following Boolean function and realize it using two input logic gates F= AB+BC+B'C.

10. Write the truth table for the half adder circuit. Realize it using logic gates.

PART – B

Answer any FOUR questions **4 x 15 = 60 Marks**

11. (a) You have been given with a diode that maintains the constant output voltage across the cathode and anode during reverse bias. Draw the circuits for forward and reverse bias of the given diode. Explain its working in both the cases with suitable graphs. (10)
    (b) With the help of the energy band diagram of a PN junction, explain its Fermi energy levels. (5)

12. (a) A half-wave diode rectifier has a forward voltage drop of 0.7 V. The load resistance is 600 Ω. The RMS value of the ac input is 28.87 V. Calculate I_{dc}, I_{rms}, PIV, and form factor. (10)
    (b) Two identical diodes are used to rectify the given ac voltage. Draw the circuit for the same by properly selecting the transformer. Derive the expressions for RMS and average value of the currents. (5)

13. (a) With necessary circuit diagram and expressions, explain in detail the voltage divider bias circuit applied to a bipolar junction transistor. (10)

(b) With a suitable circuit diagram, derive the gain of a non-inverting amplifier using operational amplifier. (5)

14. (a) Identify the transistor which has a channel and metal oxide layer in it. Study the various characteristics of the identified device with suitable circuit diagram and necessary graphs. (10)

(b) Explain the operation of bipolar junction transistor with necessary diagram. (5)

15. Derive the expression for the output of a summing amplifier using operational amplifier with suitable sketch. State and explain the conditions at which this circuit acts as

(a) Summer

(b) Averaging circuit.

16. (a) Design a full adder circuit that sums three binary inputs and gives two outputs (ie., sum and carry). Realize the Boolean expression obtained from the design using logic gates. (10)

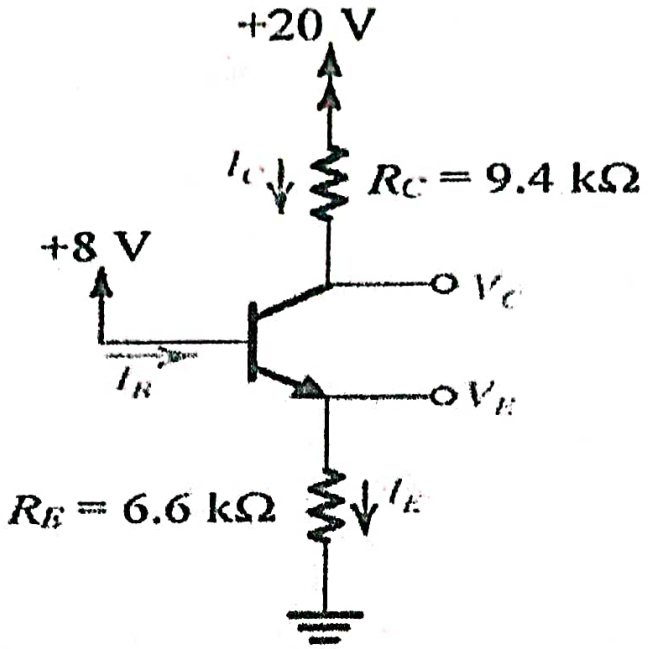
(b) Simplify the following Boolean function using K - map. (5)

$$F(w,x,y,z) = \sum (0,1,2,4,5,6,8,9,12,13,14).$$

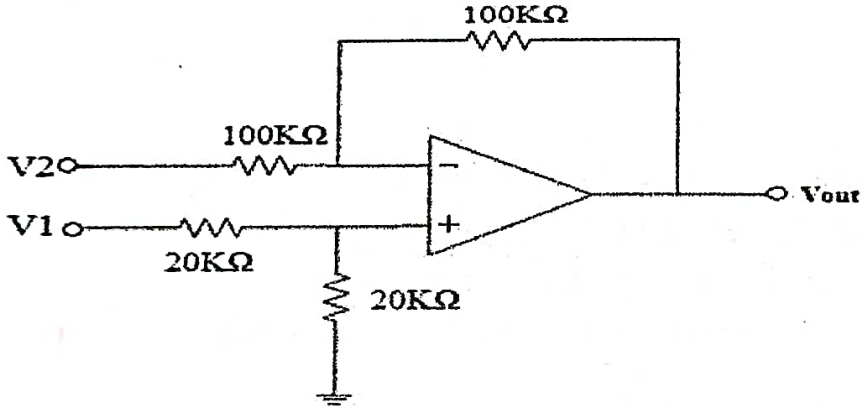
PART – C

Answer the following **1 x 20 = 20 Marks**

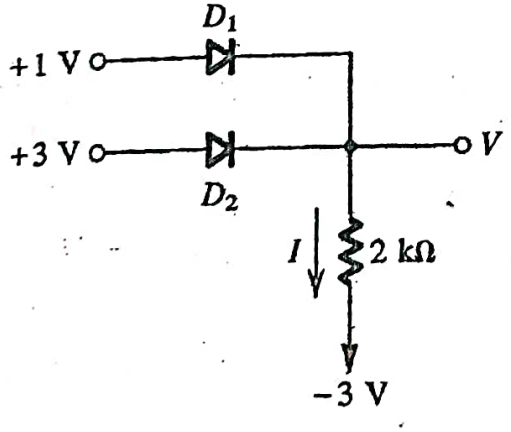
17. (a) An active BJT circuit is given below, estimate the nodal voltage (V_E & V_B) and branch current (I_B, I_C & I_E). (10)



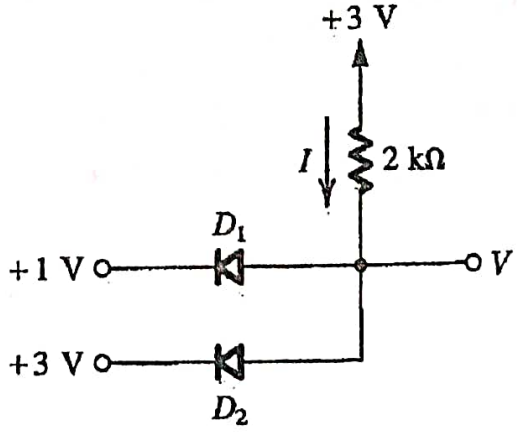
(b) Determine the output voltage for the following operational amplifier circuit. (5)



(c) The circuits given below are designed with a silicon diode. Apply your basic knowledge about the characteristics of the diodes to estimate the output voltage V and current I. Consider the diodes are ideal. (5)



(a)



(b)

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