MANIPAL ACADEMY of HIGHER EDUCATION
(Deemed to be University under Section 3 of the UGC Act, 1956)

Question Paper - Report

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Back

Question Paper

MANIPAL ACADEMY OF HIGHER EDUCATION

B.Tech I Semester MIDSEM Examination September 2024

FUNDAMENTALS OF ELECTRONICS [ECE 1072]

Marks: 30 **Duration: 90 mins.**

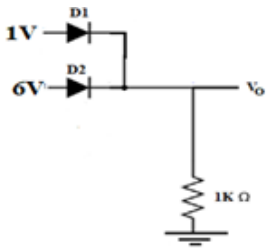
MCQ

Answer all the questions. Section Duration: 20 mins

1) Which of the following statement is true? (1)

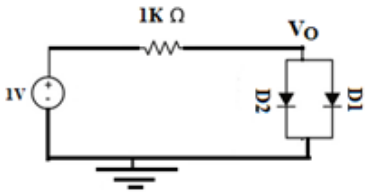
Ideal value of input resistance of OP-AMP is Zero. | Ideal value of output resistance of OP-AMP is Infinity. | Ideal value of input offset voltage of OP-AMP is Zero. | Ideal value of CMRR of OP-AMP is Zero.

2) For the circuit shown below, the output voltage is ----------. Assume D1 as Silicon diode and D2 as ideal diode. (1)



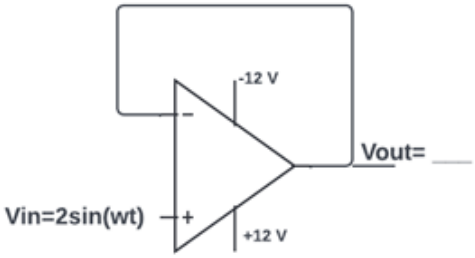
0 V | 0.3V. | 0.7V. | 6V

3) For the circuit shown, the output voltage VO is ---------. Assume D1 to be Ge diode, D2 to be ideal diodes. (1)



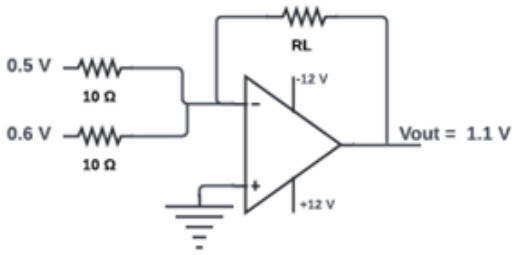
1V. | 0.3V. | 0.7V. | 0V.

4) For the given circuit find the output voltage (V_{out}) (1)



sin(wt) 2sin(wt) cos(wt) 2cos(wt)

5) For the given circuit find the value of resistance (RL)



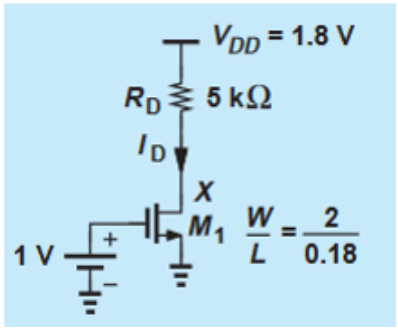
(1)

10 Ω 1K Ω 100 Ω 1 Ω

DESCRIPTIVE

Answer all the questions.

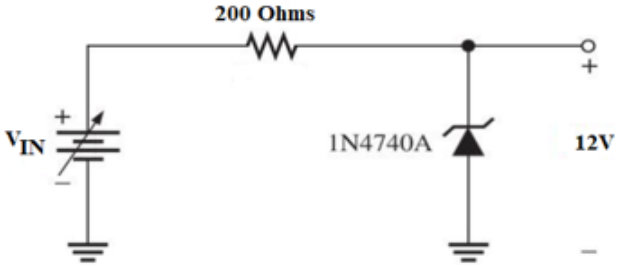
6) Obtain an expression for drain current of MOSFET in terms of gate to source voltage, drain to source voltage and aspect ratio. Also, sketch V_{DS} – I_D Characteristics and mark the various region of operation. For the circuit shown in the figure, find the region of operation of MOSFET. Assume $\mu_n C_{OX} = 200\mu A/V^2$, $V_{TH} = 0.5V$



(4)

7) A Silicon diode carries a reverse saturation current of 1pA at 20^0C. Determine the diode bias current, when the temperature changes to 100^0C for a bias voltage of 0.7V. Also, find the dynamic forward resistance of the diode at 100^0C. (3)

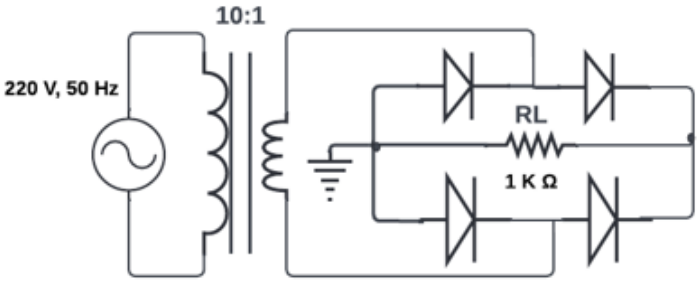
8) Determine the range of V_{IN} to obtain a regulated output voltage of 12V in the circuit shown below. Assume the power rating of 1N4740A and minimum value of Zener current as 1W and 0.3mA.



(3)

9) (3)

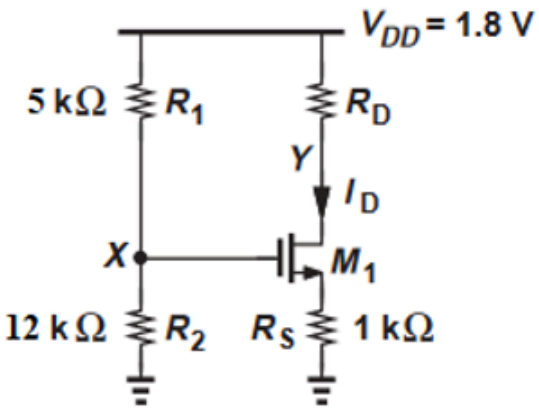
For the circuit shown in the figure, assuming ideal diodes, determine
(a) DC output voltage
(b) Rectifier efficiency
(c) Peak inverse voltage
(d) DC Output voltage, if a capacitor of 1mF is connected across R_L.
(e) RMS output current
(f) Output frequency.



10) Design the circuit using two OPAMPs such that output voltage is given by $V_o = 5V_1 - 2.5\,V_2 - 10\,V_3$, where V_1, V_2, V_3 are inputs to the OPAMP. Assume feedback resistance as 10KΩ. (3)

11) For the circuit shown in figure, determine the maximum allowable value of $\mathbf{R_D}$ that can maintain M1 in saturation region.

Assume $V_{TH} = 0.4V$, $\mu_n C_{ox} = 100\ \mu A/V^2$, $\frac{W}{L}$ =4/0.18



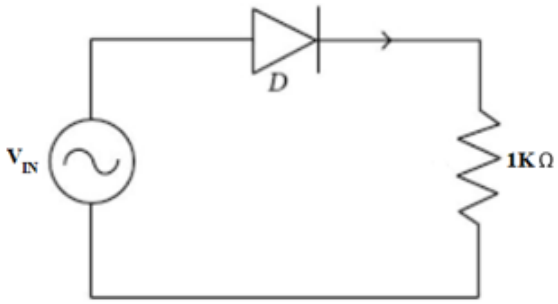
(3)

12) Consider an OP-AMP that gives an output voltage of 10V with input voltages V_1= 0.5 mV and V_2 = – 0.5mV. If the same OP-AMP gives an output voltage of 10mV for V_1 = 0.5mV and V_2 = 0.5mV, determine the CMRR of OP-AMP. (2)

13) Design a circuit using an OP-AMP to obtain a voltage gain of 5. Assume the feedback resistance value as 10KΩ. (2)

14) (2)

In the circuit shown, find the DC Current through 1KΩ resistance for an input voltage of $V_{IN} = (10 \text{ Sin}(wt) + 12)$ Volts



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^ Top