

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5553

J

Unique Paper Code : 2512043602

Name of the Paper : Analog Devices and Circuits

Name of the Course : **B.Sc. (H) Instrumentation**

Semester : VI

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Use of scientific calculator is allowed.
3. Question No. 1 is compulsory. All questions carry equal marks. Attempt **any 5** questions in all.

1. (a) Sketch the V-I characteristics of a Tunnel diode. (3)
- (b) Compare Schottky diode with a conventional p-n junction diode. (3)
- (c) What is a solar cell? Define its fill factor. (3)
- (d) Draw the output characteristics of a JFET. When V_{GS} of JFET changes from -3.1 V to -3 V, the drain current changes from 1 mA to 1.3 mA. What is the value of transconductance? (3)
- (e) Define threshold voltage of a MOSFET. (3)
- (f) Draw the symbol of a n-channel and p-channel depletion mode and enhancement mode MOSFET. (3)

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2. (a) Explain the working of varactor diode. (6)
- (b) What is photodiode? Describe its operation. (6)
- (c) Explain the working principle of Liquid crystal display. (6)
3. (a) Describe the dc analysis of fixed bias circuit of JFET. (6)
- (b) Why FET is called as “voltage-operated device”? Define the Amplification factor in JFET? (6)
- (c) Determine I_D and V_{GS} for the JFET with voltage-divider bias shown in Fig. 1, given that $V_D = 7V$. (6)

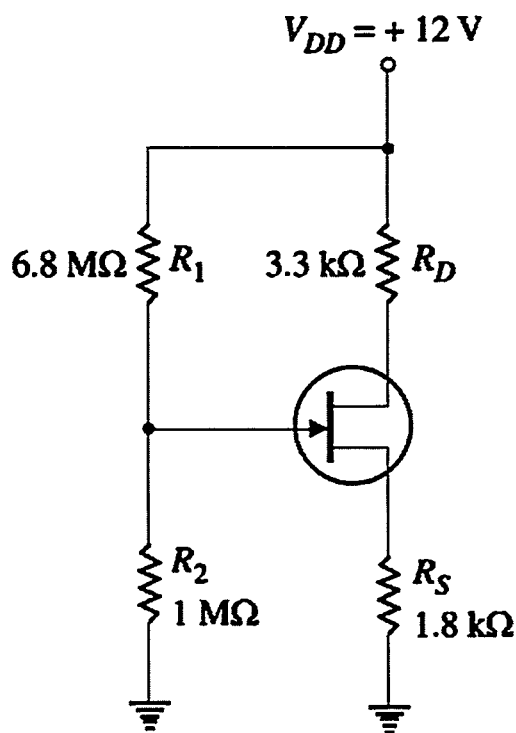


Fig. 1

4. (a) Explain the construction of n channel MOSFET using suitable diagram. (6)
- (b) Explain the accumulation, depletion, and inversion cases for an ideal MOS diode. (6)
- (c) What does UJT stand for? Explain various regions in the I-V characteristics of UJT. (6)
5. (a) Draw and explain the DC transfer characteristics of CMOS inverter. (6)
- (b). Differentiate between noise margin and noise immunity for the CMOS circuits. Define V_{IL} , V_{IH} , V_{OL} , V_{OH} for CMOS inverter and also depict the same using suitable diagram. (6)
- (c) Draw the circuit and explain the working of a relaxation Oscillator. Also plot the output waveform. (6)
6. (a) Draw the small signal model of common source amplifier circuit of n channel MOSFET. Obtain expressions for input impedance, output impedance and voltage gain. (8)
- (b) Define intrinsic standoff ratio (η) of a Unijunction Transistor (UJT). The intrinsic stand-off ratio (η) for a UJT is 0.6. If the inter-base resistance is $10\text{ K}\Omega$ (R_{BB}), what are the values of R_{B1} and R_{B2} ? (6)
- (c) Differentiate between photovoltaic cell and photoconductive cell. (4)
7. (a) For Common Drain amplifier shown in the Fig. 2, $g_m = 2.5\text{mS}$, $r_d = 25\text{K}\Omega$. Calculate input impedance, output impedance and voltage gain. (6)

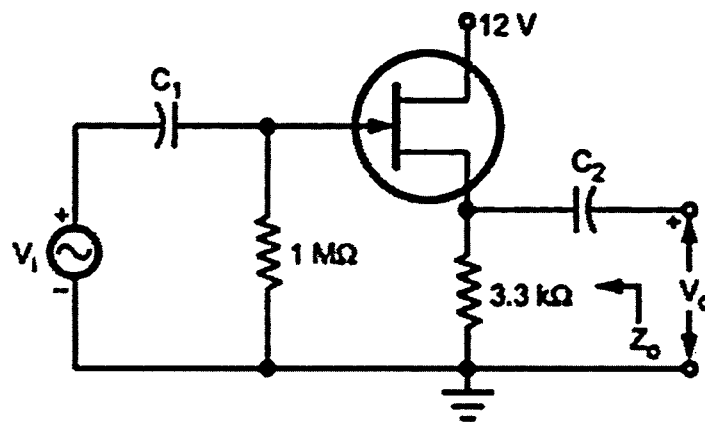


Fig. 2

- (b) Explain the dc biasing of E MOSFET in voltage divider configuration. (6)
- (c) What is a thermistor? List the two primary types of thermistors and state their characteristics. (6)