

Printed Pages—4

TEC101

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

PAPER ID : 3033

Roll No.

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B. Tech.

(SEM. I) ODD SEMESTER THEORY EXAMINATION
2010-11

ELECTRONICS ENGINEERING

Time : 3 Hours

Total Marks : 100

Note : Attempt **all** the questions. All questions carry equal marks.

1. Attempt any **four** parts of the following : **(5×4=20)**
 - (a) Explain the effect of acceptor and donor impurities in an intrinsic semiconductor.
 - (b) Draw and explain the equivalent circuit of a p-n junction diode.
 - (c) Classify conductors, semiconductors and insulators on the basis of energy band diagram.
 - (d) For a semiconductor diode, define static and dynamic resistances.
 - (e) Explain the working of a p-n junction diode under forward biased and reverse biased condition.
 - (f) Explain diffusion and transition capacitance.
2. Attempt any **four** parts of the following : **(5×4=20)**
 - (a) Sketch the circuit for a half-wave rectifier. Explain its operation and derive the expression for the dc current.
 - (b) What is voltage multiplier ? Explain with voltage doubler circuit.

- (c) Describe the physical mechanism of zener breakdown. For the circuit of Figure 1, find the voltage drop across the 5 kΩ resistance.

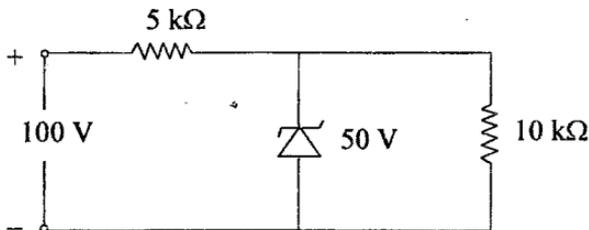


Figure 1

- (d) What is filter ? Explain working principle of a capacitive filter with suitable diagram.
- (e) Draw circuit diagrams to show two methods of producing a positive output voltage from a halfwave rectifier. Explain briefly the circuit operations.
- (f) What is clipper circuit ? How does such a circuit differ from a clamper circuit ? Draw typical circuits for both.
3. Attempt any **two** parts of the following : (10×2=20)
- (a) Sketch a voltage divider bias circuit using an npn transistor. Show all voltage polarities and current directions. Explain the operation of the circuit and write the approximate equations for V_B , I_E , I_C and V_{CE} .
- (b) Derive the expressions for voltage gain, current gain and input impedance in terms of h-parameters for common emitter amplifier.
- (c) A junction transistor has the following h-parameters $h_{ie} = 2k$, $h_{re} = 1.6 \times 10^{-4}$, $h_{fe} = 50$, $h_{oe} = 50 \mu A/V$. Determine the current gain, voltage gain, input resistance and output resistance of CE amplifier if the load resistance is 12 kΩ and source resistance is 500 Ω.

4. Attempt any **two** parts of the following : (10×2=20)
- (a) What is the significant difference between the construction of an enhancement type MOSFET and depletion type MOSFET ? Explain with suitable diagram.
- (b) What are the advantage of the FET over a conventional bipolar junction transistor ? Define Pinch-off voltage, amplification factor and drain resistance of FET. Explain with the help of circuit diagram, how an FET is used as a voltage dependent resistor.
- (c) Determine the following for the network of figure 2.
 $-V_{GSQ}$, I_{DQ} , V_D , V_G , V_S and V_{DS} .

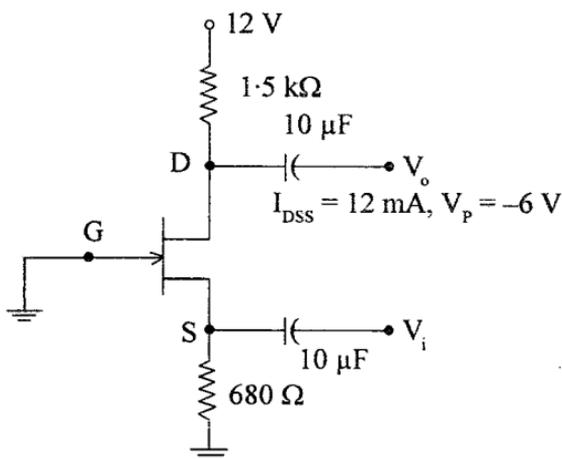


Figure 2

5. Attempt any **four** parts of the following : (5×4=20)
- (a) Prove that NAND and NOR gates are universal gate.
- (b) Explain the terms in Op-Amp :
- (I) Input offset current
 - (II) Slew rate
 - (III) CMRR.

- (c) Draw the circuit diagram of Op-Amp as summer. Also find out the expression for output.
- (d) Minimize using K-Map :
 $f(A, B, C, D) = \Sigma m(0, 2, 3, 5, 7, 12, 15) + \Sigma d(1, 4, 8, 11)$.
- (e) Compare characteristics of an ideal Op-Amp and practical Op-Amp.
- (f) Obtain the following conversions :
- (i) $(397.75)_{10} = (\quad)_{16}$
- (ii) $(101010.10)_4 = (\quad)_8$
- (iii) $(23.AB)_{16} = (\quad)_2$
- (iv) $(101.01)_2 = (\quad)_{10}$
- (v) $(7841)_9 = (\quad)_{10}$