

(3 Hours)

Total Marks : 80

1. Question No.1 is compulsory.
2. Answer any three from remaining questions.
3. Figures to the right indicate full marks.
4. Assume suitable data if required.

Q1. Attempt any four.

- a Explain the effect of temperature of on VI characteristics of a PN junction diode. 05
- b What are the important parameters of a JFET? How these parameters are determined graphically? 05
- c What is Early effect? Explain how it affects the BJT characteristics in CB configuration. 05
- d For the circuit shown in figure.1 draw the output waveform. Assume diode is ideal. 05

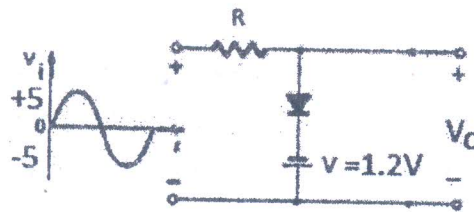


Fig.1

- e For the FET shown in figure.2 the drain current equation is 05

$$I_{DQ} = 9 \left( 1 + \frac{V_{GSQ}}{3} \right)^2 \text{ mA, Determine } I_{DQ}, V_{GSQ}, V_{DSQ}, V_D$$

$$V_{DD}=20V, R_D=2k\Omega, R_S=1.5k\Omega, -V_{SS}=-10V.$$

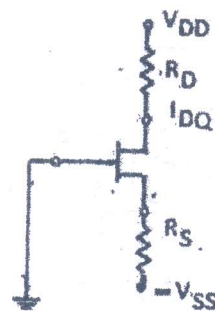
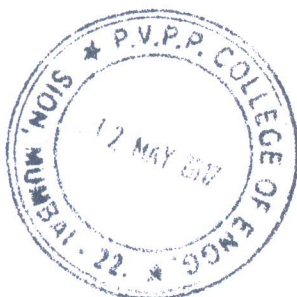


Fig.2



- Q2. a Describe the construction and operation of an N-channel MOSFET in enhancement mode. Draw its characteristics and equivalent circuit of the device. 10
- b Describe the different MOSFET biasing techniques .Determine the drain current, drain to source voltage, and Power dissipated in the transistor of CS circuit with an N-channel E MOSFET shown in figure 3.  $R_1 = 30k\Omega$  ,  $R_2 = 20k\Omega$ ,  $R_D = 20k\Omega$ ,  $R_S = 0.5k\Omega$ ,  $V_{DD} = 5V$ ,  $V_{TN} = 1V$ ,  $k_N = 0.1mA/V^2$  10

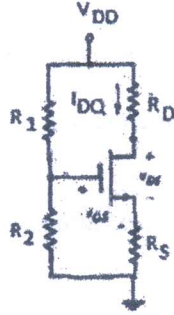


Fig.3

- Q3. a Draw input and output characteristics of CE amplifier. Explain graphical analysis to determine parameters.(Zi, Zo, AV, and Ai) 10
- b In the Common Emitter configuration with voltage divider bias  $I_E = 1mA$  10  
 $V_{CE} = 2V$  ,  $R_E = 1k\Omega$  and  $\beta = 49$  . Determine the values of  $R_C$  ,  $R_1$  and  $R_2$  such that the stability factor does not exceed 5. Assume  $V_{CC} = 5V$  and  $V_{BE} = 0.3V$  .

- Q4. a For the amplifier shown in figure.4 analyze and determine 10
- i) Small-signal hybrid pi parameters of BJT
  - ii) Small-signal voltage gain
  - iii) Input and output impedance.

The circuit parameters are:  $R_1 = 56k\Omega$  ,  $R_2 = 12.2k\Omega$  ,  $R_E = 0.4k\Omega$  ,  
 $R_C = 2k\Omega$ ,  $R_L = 10k\Omega$ ,  $V_{CC} = 10V$  and BJT parameters are  
 $\beta = 100$ ,  $V_{BE} = 0.7V$

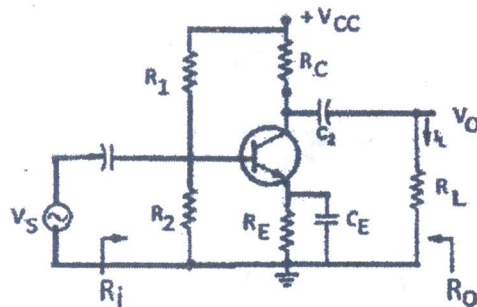


Fig.4



TURN OVER

