

Indian Institute of Information Technology Ranchi

Roll No. 2022 463001

Department of Electronics & Communication Engineering
B. Tech End-Semester Examination – Autumn Semester 2022-23

Semester: First

Course Code: EC-1001

Course Instructor: Prof. S. K. Mandal, Dr. Rashmi Panda

Course Name: Electronics Devices and Circuits

QUESTION PAPER

Duration: 3 hrs.

Instructions:

Max Marks: 100

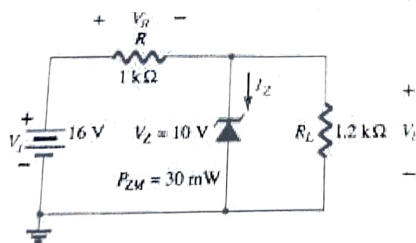
- (1). Number in [] indicates marks.
- (2). Any missing data can be assumed suitably.
- (3). Symbols have their usual meaning.

Section A (Answer All)

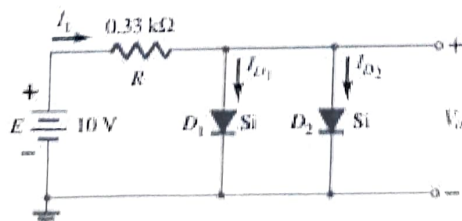
1. (a) Explain the “pinch-off” phenomena in JFET [2]
- (b) Calculate the stability factor $S(I_{co})$ and the change in I_C due to change in I_{co} when the temperature varies from 25°C to 100°C for the Silicon Transistor ($\beta=50$). The following table shows variation of parameters with temperature for the emitter-bias circuit where $R_B=250R_E$. [2]

$T (^\circ\text{C})$	$I_{CO} (\text{nA})$
25	0.1
100	20

- (c) What is the role of capacitors at low frequencies and high frequencies in BJT modelling? [2]
- (d) Obtain the relation between the parameters α , β , γ of a bipolar junction transistor? [2]
- (e) Differentiate between knee voltage and breakdown voltage. [2]
- (f) Write a short note on light emitting diode (LED). [2]
- (g) Compare different configurations (CE, CB and CC) of BJT. [2]
- (h) Determine the currents V_L , V_R , I_Z [2]



- (i) Determine the currents V_o , I_L , I_{D1} , and I_{D2} for the following circuit having Silicon diodes [2]

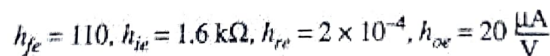
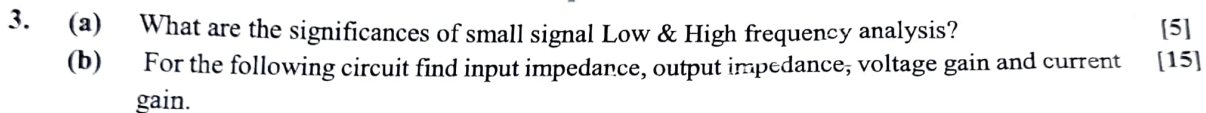


- (j) The resistivity of a uniformly doped n-type silicon sample is $0.5 \Omega\text{-cm}$. If the electron mobility (μ_n) is $1250 \text{ cm}^2/\text{V-sec}$ and the charge of an electron is $1.6 \times 10^{-19} \text{ Coulomb}$, then find the donor impurity concentration (N_D) in the sample. [2]

2. (a) For the following circuit $I_{CO} = 2 \text{ mA}$ and $V_{CEQ} = 10 \text{ V}$, determine R_B , R_C and R_E .
 $V_{CC} = 20 \text{ V}$



- [10]



- [4x5]