Silicon

...beyond teaching

Silicon Institute of Technology

Silicon Hills, Bhubaneswar

| An Autonomous Institute |

1st Semester B.Tech Mid Term Examination 2019-2020
BASIC ELECTRONIC ENGINEERING(18ESIT01)

Duration: 01:30   Full Marks: 25

1 *Answer All*

a In an intrinsic semiconductor, the number of holes   1

   a. Equals the number of free electrons

   b. Is greater than the number of free electrons

   c. Is less than the number of free electrons

   d. None of the above

b What is the relation between the time period of a waveform and its frequency? For a   1
   sinusoidal signal of time period, 1 msec find the frequencies f and ω.

c In the circuit shown below, the Zener diode has a breakdown voltage $V_z = 6\ volt$.   1
   Determine the voltage V_o. Assume the Zener diode to be ideal.
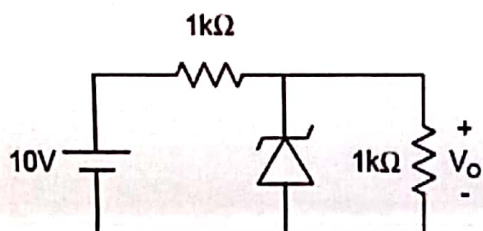
d Write the relation between α and β.   1

e What is Q-point in BJT?   1

f Discuss the function of R_C and R_E in voltage divider biasing of BJT CE configuration.   1

g The figure shows a half-wave rectifier. The diode D is ideal. Find the approximate value of   1
   average steady-state current (in Amperes) through the diode.
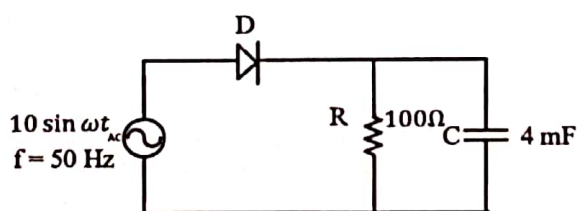
2 *Answer any Two*

a Write down some differences between center-tapped and bridge type full wave rectifier with a   2
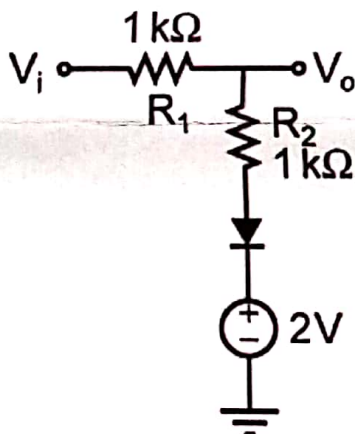   diagram.

[P. T. O.]

b Determine v_o for the network using a silicon diode with threshold voltage 0.7 V for the applied input as shown in the figure.
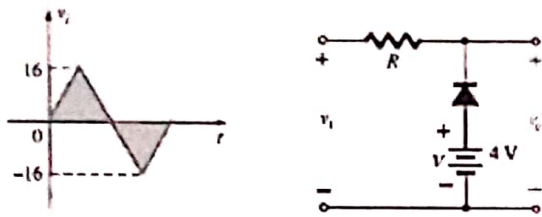
c Determine I , V_1 , V_2 , and V_o for the series dc configuration as shown in the figure.
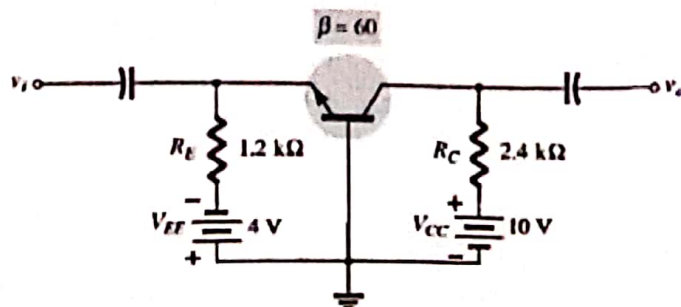
2
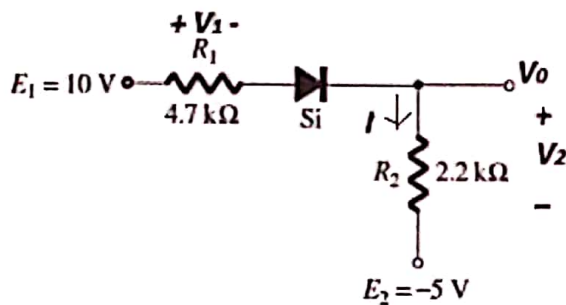
d The diode in the circuit shown has a $v_{on} = 0.7$ Volts. If $v_i = 5\ \sin(\omega t)$ Volts. Sketch the output waveform (v_0), and determine the minimum and maximum values of v_0.

2

3 Answer any One

a Draw the fixed bias circuit and write down the expression for I_B , V_{CE}?

2

b Find out I_B , V_{CE} and V_{CB} for the given circuit?

2

[P. T. O.]

4 Answer any Two

a A full-wave bridge rectifier is supplied with an input voltage $V_i = 20 \sin \omega t$ and load resistance $R_L = 400\,\Omega$. Evaluate   3

(i) $I_m, I_{d.c.}, I_{rms}$ (iii) a.c. power input and d.c. power output

(ii) d.c. output voltage   (iv) efficiency of rectification

b A resistance of 2 kΩ is connected in parallel with an ideal diode; this combination is connected in series with another 1 kΩ resistor and this whole circuit is connected with the 25 V supply. Calculate the:-   3
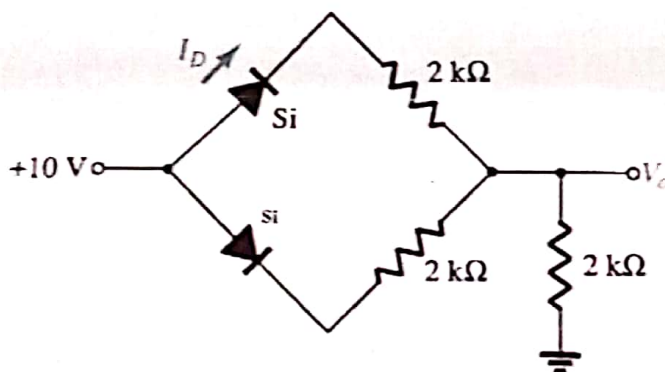
(1) Current drawn by the whole circuit.

(2) Current flow in the diode connected branch.

(3) Current flow in the resistance which is parallel with the diode.

(4) Output voltage i.e. voltage across the output resistance.
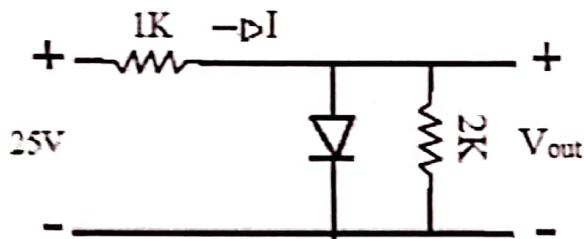
c Determine V_0 and I_D for the network given below   3

5 Answer any Two

a Differentiate between the common emitter and common base configuration with the help of input and output characteristics graph.   3

b With a neat and clean diagram, differentiate between fixed bias circuit and voltage divider biasing circuit. Which one is more stable and why?   3

c Design a voltage divider circuit using a supply 24V, β=110 and an operating point of I_{CQ}=4mA and V_{CEQ}=8V. Choose $V_E = (1/8)V_{CC}$.   3