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3E-1462

Roll No. : _____

1462

B. E. - II Year (Sem. III) Examination, December – 2007

Electronic Device & Circuits

(Common to Computer Engg. & IT)

Time : 3 Hours] [Total Marks : 80

[Min. Passing Marks : 24

*Attempt overall **5** questions selecting **one** question from each unit.*
*All questions carry **equal** marks.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. Nil 2. Nil

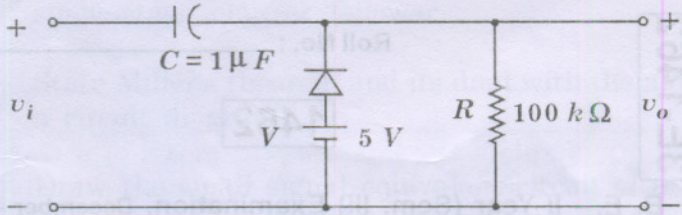
1 (a) Consider a circuit consisting of a diode D, a resistance R, and a signal source v_i in series. Define :
(1) Static characteristics
(2) Dynamic characteristics
(3) Transfer characteristics
(4) Correlation between (ii) and (iii) 12

(b) What is a comparator circuit ? How does such a circuit differ from a clipping circuit ? 4

OR

1 (a) Sketch the circuit for full wave rectifier. Derive the expressions for
(1) dc current
(2) dc load voltage
(3) dc diode voltage
(4) the rms current 12

(b) Explain the circuit given below with the help of suitable input



4

2 Explain the construction and working principle of following devices :

(1) VJI

(2) Phototransistor

(3) LDR

(4) Solar cell.

16

OR

2 (a) For a phototransistor in the active region, write the expression for the collector current. Define all terms. Sketch the family of output characteristics.

8

(b) Derive the equation for the volt-ampere characteristics of a photodiode. Define each symbol in the equation.

8

3 (a) For a p-n-p transistor biased in active region plot (in each region E, B and C) :

(i) the potential variation

(ii) the minority-carrier concentration

(iii) indicate the various electron and hole current components crossing each junction.

8

(b) Draw a family of CS drain characteristics of an n-channel JFET. Explain the shape of these curves qualitatively. Define the pinch-off voltage V_p. 8

OR

3 (a) Explain the h-parameter model of a transistor at low frequencies and derive the formulas for :
(1) Current gain
(2) Voltage gain
(3) Input impedance. 12

(b) Draw a self-bias circuit. Explain why such a circuit is an improvement over fixed-bias circuit. 4

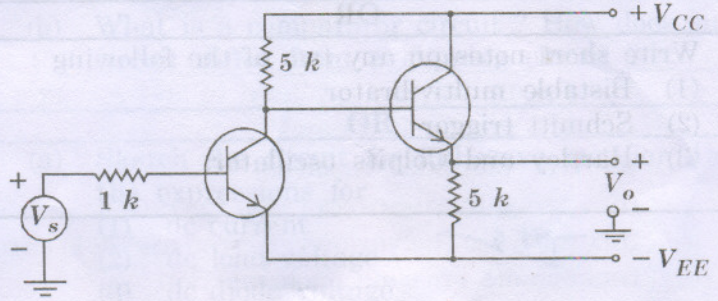
4 Shown in figure below is a two-stage amplifier circuit in a CE-CC configuration. The transistor parameters are

$h_{ie} = 2\,k$, $h_{fe} = 50$, $h_{re} = 6 \times 10^{-4}$

$h_{ic} = 2k$, $h_{fc} = -51$, $h_{re} = 1$

$h_{oe} = 25\ \mu A/V$, $h_{oc} = 25\ \mu A/V$

Find the input and output impedances and overall voltage and current gains



16

OR

4	(a)	Draw a Darlington emitter follower. Explain why the input impedance is higher than that of a single-stage emitter follower.	4
	(b)	State Miller's theorem and its dual with the aid of a circuit diagram.	4
	(c)	Draw the small signal equivalent circuit of a CS (common-source) amplifier and derive the expression for voltage gain.	8

5	(a)	What are the four possible topologies of a feedback amplifier ? Identify the output signal X_0 and the feed back signal X_f for each topology.	4
	(b)	Give the two Barkhausen conditions required in order for sinusoidal oscillator to be sustained. State the frequency stability criterion.	4
	(c)	Draw and explain the circuit of a Wien bridge oscillator. What determines the frequency of oscillations ? Will oscillations take place if the bridge if balanced ? Explain.	8

OR

5		Write short notes on any two of the following : (1) Bistable multivibrator (2) Schmitt trigger (3) Hartley and Colpits oscillator.	8+8