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Printed Pages : 4 TEC502

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

PAPER ID : 3086 Roll No.

B.Tech

(SEM V) ODD SEMESTER THEORY EXAMINATION 2009-10

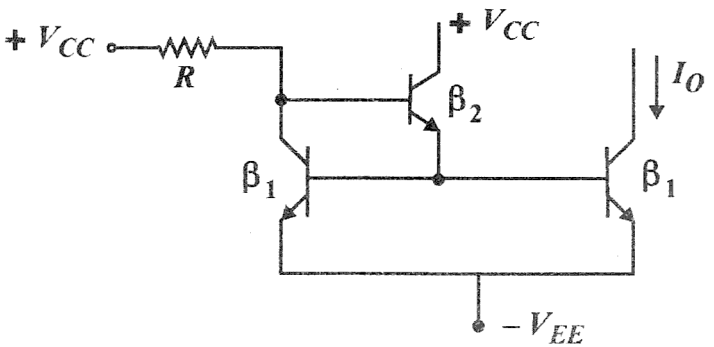
ANALOG INTEGRATED CIRCUITS

Time : 3 Hours] *[Total Marks : 100*

Note : *Attempt all questions.*

1 Answer any **two** of the following : **10×2=20**

(a) Derive the expression for I_0 in the following circuit.



Also find the output impedance.

(b) Draw the output stage of a $741-C$ op-amp and explain how it protects the op-amp against short circuit. Also derive the output impedance.

(c) Explain the working of a CC level shifter and give proper reasons as to why the lower resistance in emitter is replaced by a current mirror.

2 Answer any **two** of the following : **10×2=20**

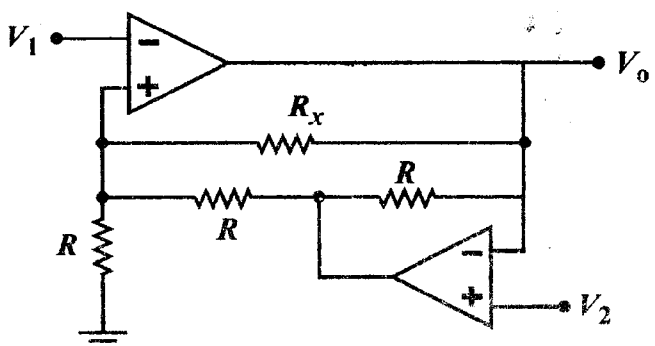
(a) Design a 741-C based INV amplier for $A_v = -20$ such that the circuit offers maximum input impedance. Given

$V_{os(max)} = 6\,mV$ and $(R_1 \,||\, R_2)$

$I_{os(max)} = 9\,mV$ where

$I_{os(max)} = 260\,nA$.

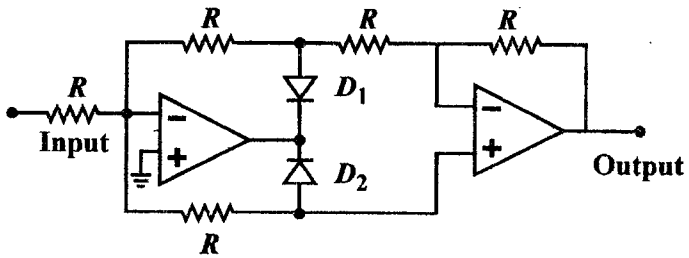
(b) Calculate V_0 in the following circuit :



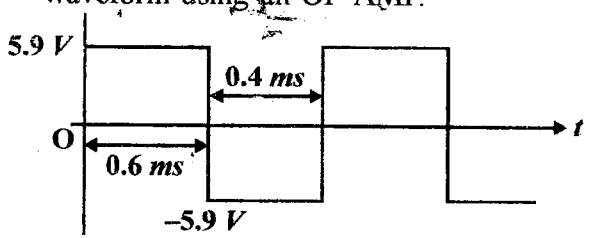
(c) Design a biquad filter with $f_0 = 8\,kHz$, $BW = 250\,Hz$ and a 20-dB response gain. What is the value of H_{OLP} ?

3 Answer any **two** of the following : **10×2=20**

(a) Explain the working of the following circuit and draw its output wave form if input is a $\pm 5V$ sine. Assume D_1, D_2 to be ideal.



(b) It is required to generate the following waveform using an OP-AMP.



Design a circuit.

(c) Draw an OP-AMP based Monostable multivibrator and explain its working.

4 Answer any **two** of the following : **10×2=20**

(a) Design a LM 723 based voltage regulator with following parameters :

(i) Input voltage (16V-20V)

(ii) Output voltage = 6V

(iii) $I_{L\,(max)} = 250\,mA$

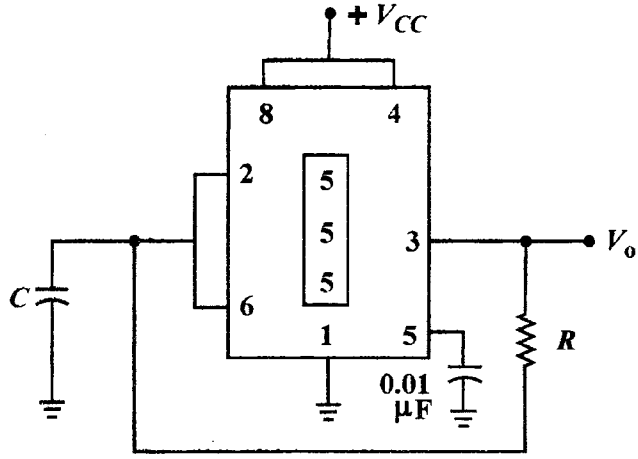
(iv) $I_{sc} = 75\,mA$

(b) Explain the basic principle of SMPS. List the merits and demerits.

(c) Draw the internal circuit of an off the shelf bipolar OTA and explain its working.

5 Answer any **two** of the following : **10×2=20**

(a) Explain the working of the following circuit :



(b) It is required to generate a frequency 4f from an input frequency of f. Suggest a circuit and explain its working.

(c) Design an OP-AMP based amplifier to give a voltage gain of 2, 3, 5 and 9 depending upon the status of 2 digital inputs X_1 and X_2.
