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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.

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B.Tech

(SEM V) ODD SEMESTER THEORY EXAMINATION 2009-10

ANALOG INTEGRATED CIRCUITS

Time : 3 Hours]

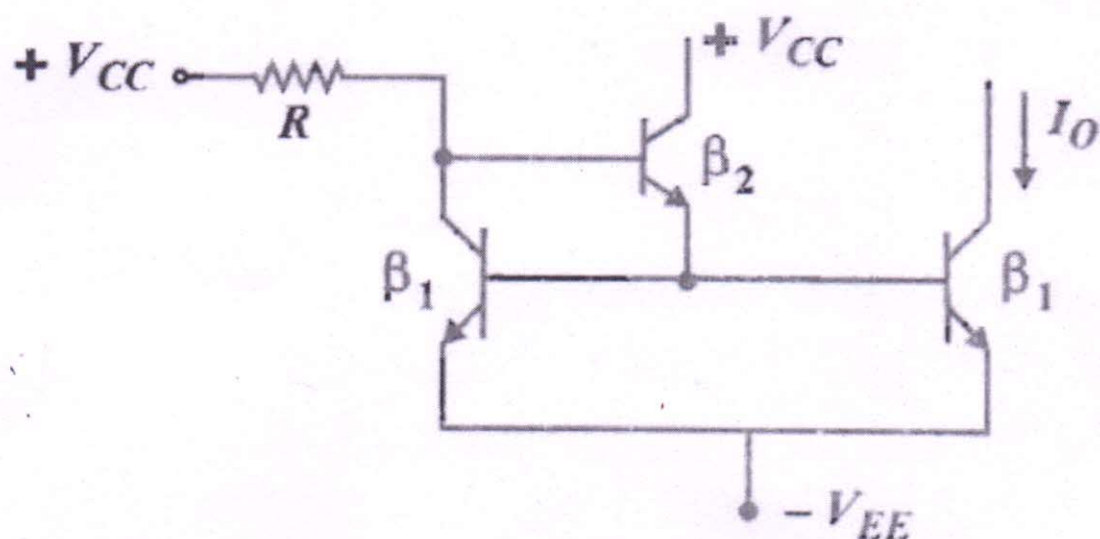
[Total Marks : 100

Note : Attempt all questions.

1. Answer any two of the following :

10×2=20

- (a) Derive the expression for I_O 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

- (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 : $10 \times 2 = 20$

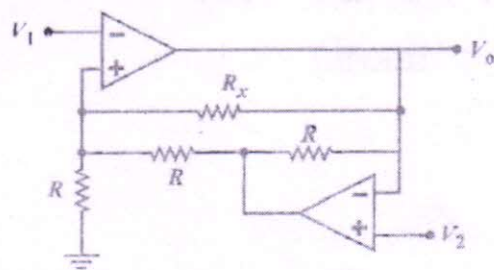
- (a) Design a 741-C based INV amplifier for $A_v = -20$ such that the circuit offers maximum input impedance. Given

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

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

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

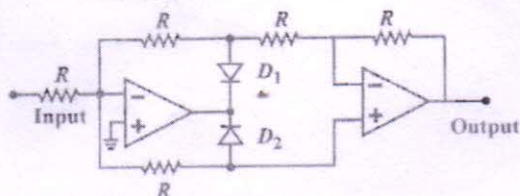
- (b) Calculate V_0 in the following circuit :



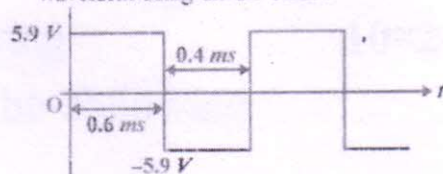
- (c) Design a biquad filter with $f_0 = 8 \text{ kHz}$, $BW = 250 \text{ Hz}$ and a 20-dB response gain. What is the value of H_{OLP} ?

3 Answer any two of the following : $10 \times 2 = 20$

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



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

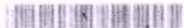


Design a circuit.

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

4 Answer any two of the following : $10 \times 2 = 20$

- (a) Design a LM 723 based voltage regulator with following parameters :
- Input voltage (16V-20V)
 - Output voltage = 6V
 - $I_L(max) = 250 \text{ mA}$
 - $I_{sc} = 75 \text{ mA}$

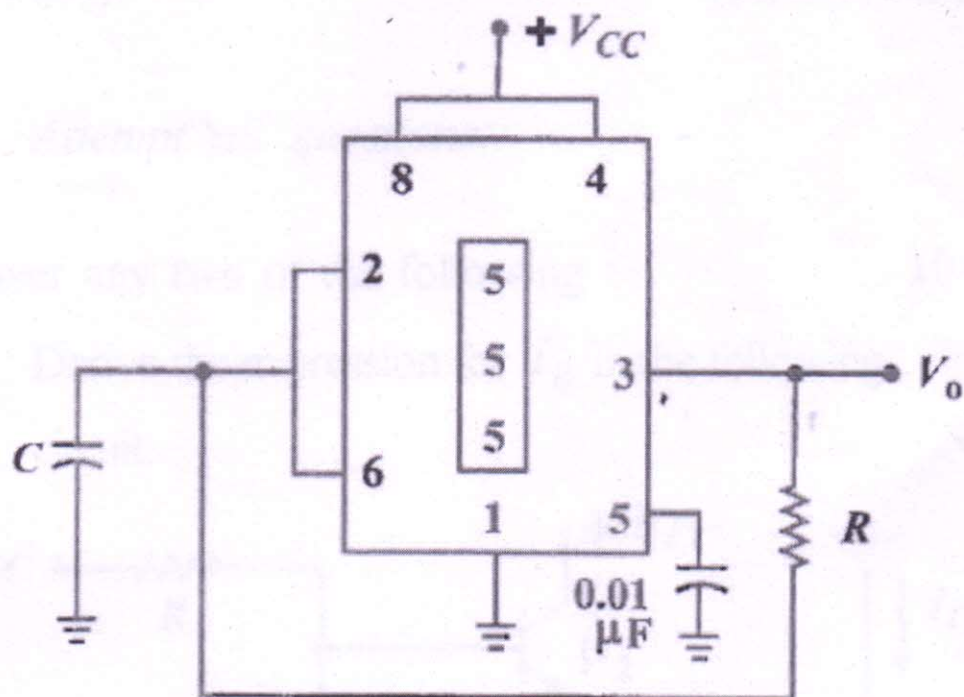


- (b) Explain the basic principle of SMPS. List the merits and demerits.
- (c) Draw the internal circuit of an off the shelf bipolar OTA and explain its working.

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 .