Total No. of printed pages = 5

CAI-506/ECD-II/5th Sem/2016/N

ELECTRONIC CIRCUITS AND DEVICES - II

Full Marks – 70

Pass Marks – 28

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer any *five* questions.

1. What is dual input unbalanced output differential amplifier configuration ? Give its circuit diagram and a.c analysis and derive the following : 14

   (i) Differential voltage gain

   (ii) Differential input resistance

   (iii) Output resistance.

2. (a) For differential amplifier determine voltage gain, input resistance, output resistance and CMRR if V_{CC}= 12V, V_{EE} = –12V, R_C = R_E = 1MΩ and transistor Q_1 and Q_2 are identical with β_{ac} = 98. Determine the output voltage when V_{in} = 0 and V_{in} = –2mV. 9

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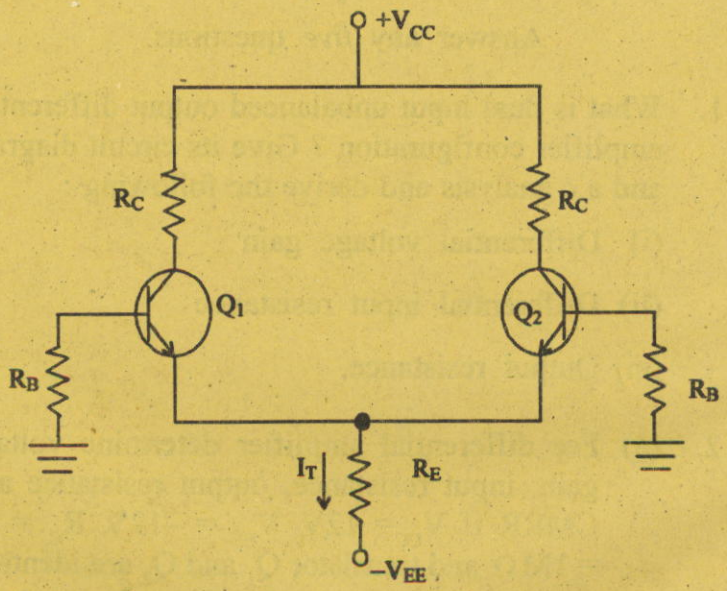
(b) In the circuit diagram $V_{CC} = +15V$, $V_{EE} = -15V$, $R_C = 10\ k\Omega$, $R_E = 10\ k\Omega$, $R_B = 20\ k\Omega$

(i) Determine output voltage if transistors Q_1 and Q_2 are identical with $\beta_{dc} = 80$.

(ii) Determine base current and base voltages.

(iii) Determine base current and base voltages if transistors Q_1 and Q_2 are identical except β_{dc}. Q_1 has $\beta_{dc} = 65$ and Q_2 has $\beta_{dc} = 85$. 5



3. (a) Explain the functional block diagram of a typical three terminal IC voltage regulator. 5

(b) Define the following parametes for IC voltage regulator : 4

(i) Line regulation

(ii) Load regulation

(iii) Output resistance

(iv) Dropout voltage.

(c) Design and draw a Zener regulator circuit to meet the following specification : 5

Load voltage = 6.8V, Input voltage = 25V, Load current = 0 – 40 mA, $I_{z\,min}$ = 5mA, P_z = 1 watt.

4. (a) What is tuned amplifier ? Draw and explain the circuit diagrams of single tuned amplifier and its frequency response. 7

(b) The tuned amplifier with capacitive coupling having R = 10 Ω, L = 20 mH and C = 0.07 μF. Determine :

(i) Resonant frequency

(ii) Q factor of the tank circuit

(iii) Bandwidth.

(c) Differentiate between active filters and passive filters. 4

5. (a) Explain the working of Wein bridge oscillator. Derive the frequency of oscillation and condition for oscillation. Also give the advantage. 3+4+1=8

(b) Explain the operation of full-wave precision rectifier with circuit diagram and give its waveform. 6

6. (a) Explain the working of an SCR giving its construction and V-I characteristics. 7

(b) Give the advantages of negative feedback. 3

(c) If the open-loop gain $A_v = 10{,}000$ and feedback ratio $\beta = \frac{1}{10}$, then for a negative feedback, find the percentage change in closed loop gain when open loop gain varies 50% with temperature. 3

(d) Positive feedback is used in 1

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7. Write short notes on any *two* : 7×2=14

(i) Stagger tuned amplifier

(ii) UJT

(iii) Crystal oscillator

(iv) Buck regulator

(v) Adjustable power supply.