Hall Ticket No | | | | | | | | | | |

Question Paper Code:AECC09

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

(Dundigal-500043, Hyderabad)

B.Tech IV SEMESTER END EXAMINATIONS (REGULAR) - JULY 2022

Regulation: UG20

ANALOG AND PULSE CIRCUITS

Time: 3 Hours (ELECTRONICS AND COMMUNICATION ENGINEERING) **Max Marks: 70**

Answer ALL questions in Module I and II

Answer ONE out of two questions in Modules III, IV and V

(NOTE: Provision is given to answer TWO questions from among one of the Modules III / IV / V

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

MODULE – I

1. (a) Discuss the operation of the CE – CE amplifiers with relevant diagrams. List the special features of Darlington pair and cascode amplifiers? [BL: Understand| CO: 1|Marks: 7]

   (b) A CE-CB (cascode) amplifier uses $R_S = 1K\Omega$, $R_{C1} = 25K\Omega$, $R_E = 100\Omega$, $R_3 = 200K\Omega$, $R_4 = 10K\Omega$. The h-parameters $h_{ie} = 2K$, $h_{re} = 0$, $h_{fe} = 100$, $h_{oe} = 0$ $R_1 = 10K\Omega$, $R_2 = 10K\Omega$. Compute individual & overall $A_I \& A_V, R_i, R_{i'}, R_o \& R_{ot}$. [BL: Apply| CO: 1|Marks: 7]

MODULE – II

2. (a) Enumerate the operation of a current series feedback amplifier with relevant terminologies. [BL: Understand| CO: 2|Marks: 7]

   (b) An amplifier has mid-band gain of 150 and a bandwidth of 300KHz.

   i) If 4% negative feedback is introduced, find the new bandwidth and gain.

   ii) If bandwidth is restricted to 1MHz, find the feedback ratio. [BL: Apply| CO: 2|Marks: 7]

MODULE – III

3. (a) With relevant circuit diagram, explain the operation of Wien-bridge oscillator. [BL: Understand| CO: 3|Marks: 7]

   (b) Determine the following for the circuit given in Figure 1. Consider the base current of 10mA.

   i) Output power

   ii) Input power

   iii) Collector efficiency [BL: Apply| CO: 3|Marks: 7]

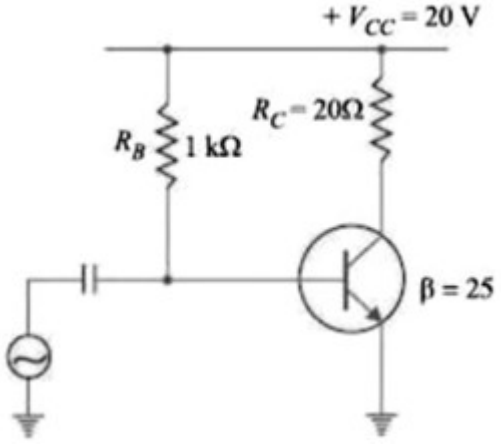

Figure 1

4. (a) With relevant circuit diagram, analyze the operation of Colpitts oscillator.
[BL: Understand| CO: 4|Marks: 7]

(b) A quartz crystal has the following values after being cut, $R_s = 1\text{k}\Omega$, $C_s = 0.05$ pF, $L_s = 3\text{H}$ and $C_p = 10$ pF. Calculate the crystals series and parallel oscillating frequencies.
[BL: Apply| CO: 4|Marks: 7]

MODULE – IV

5. (a) Analyze the responses of low pass RC circuit with square wave input. Compare the difference between sampling gate & logic gate. [BL: Understand| CO: 5|Marks: 7]

(b) In the circuit given in Figure 2, $R_L = R_1 = 100k\Omega$, $R_2 = 50k\Omega$ and the signal has a peak value of 20 V. Find

(i) Gain (A).

(ii) Minimum positive control voltage, $(V_{C(min)})$.

(iii) Minimum negative control voltage, $(V_{n(min)})$ [BL: Apply| CO: 5|Marks: 7]

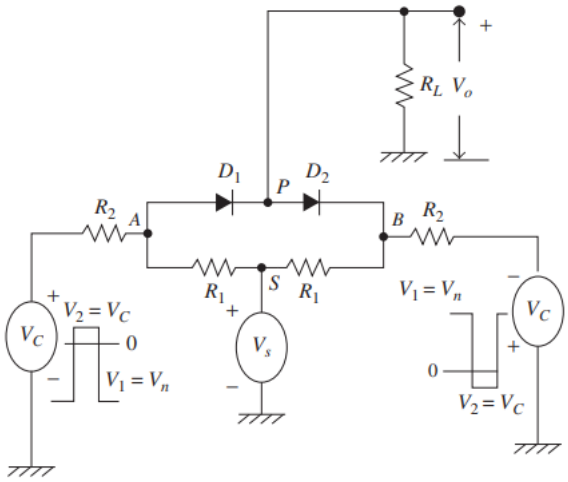

Figure 2

6. (a) With a neat circuit diagram and waveforms explain the operation of high pass RC circuit as a differentiator. [BL: Understand| CO: 5|Marks: 7]

(b) For the four-diode gate shown in Figure 3, with a divider resistance R used, $V_s = 25V$, $R_f = 20\Omega$, $R_L = R_c = 200K\Omega$ and R=100Ω. Find (Vc)min, A and (Vn)min [BL: Apply| CO: 5|Marks: 7]

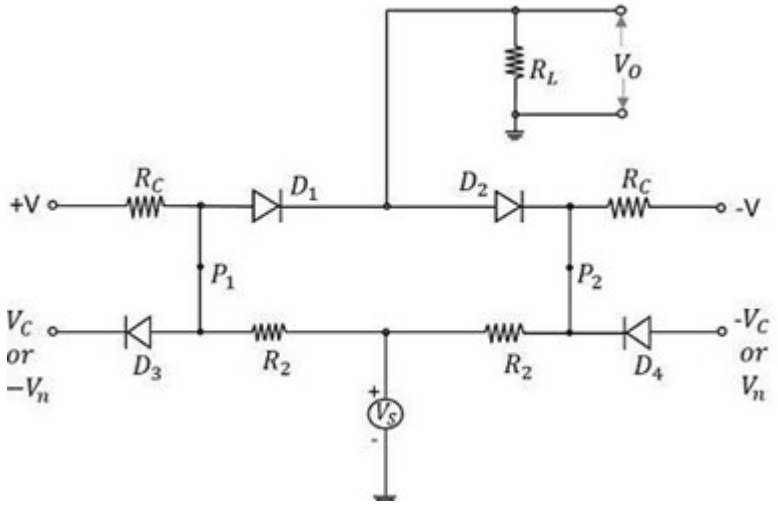

Figure 3

MODULE – V

7. (a) With a neat circuit diagram and waveforms explain the operation of transistor based monostable multivibrator. [BL: Understand| CO: 6|Marks: 7]

   (b) For the astable multivibrator in Figure 4, $R_1 = 20k\Omega$, $R_2 = 30k\Omega$, $R_{c1} = 10k\Omega$, $R_{c2} = 10k\Omega$ $C_1 = C_2 = C = 0.01\mu$F. Find the time period, duty cycle and the frequency. [BL: Apply| CO: 6|Marks: 7]

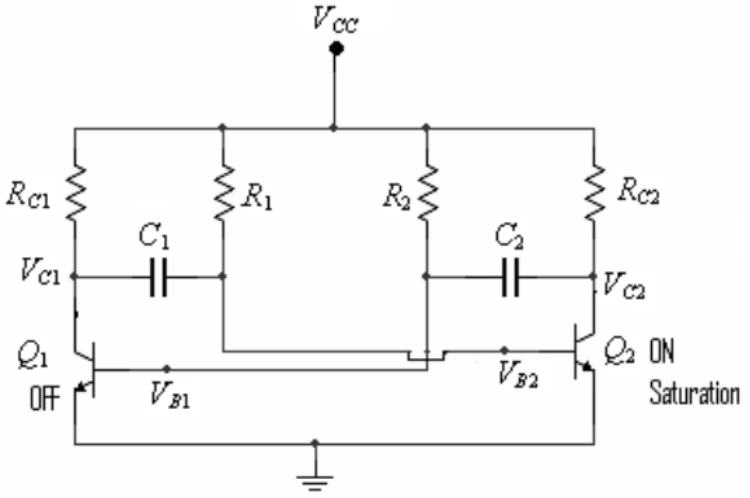

Figure 4

8. (a) With a neat circuit diagram and waveforms explain the operation of transistor based astable multivibrator. [BL: Understand| CO: 6|Marks: 7]

   (b) Consider the schmitt trigger with germanium transistor having $h_{fe} = 20$. The circuit parameter are
   $V_{CC} = 15$V, $R_S = 2$KΩ, $R_{C1} = 4$KΩ, $R_1 = 1$KΩ,
   $R_2 = 10$KΩ and $R_e = 6$KΩ.
   Find LTP and UTP. [BL: Apply| CO: 6|Marks: 7]