COMP 3 – 6 (RC)

S.E. (Computer) (Sem. – III) (RC) Examination, May/June 2012
INTEGRATED ELECTRONICS

Duration : 3 Hours | Total Marks : 100

Instructions : *1) Answer **any five** questions, atleast **one** from **each** Module.*
*2) Make suitable assumptions, **wherever** necessary.*

Module – 1

1. a) List any characteristics that an ideal op-amp should exhibit. 5

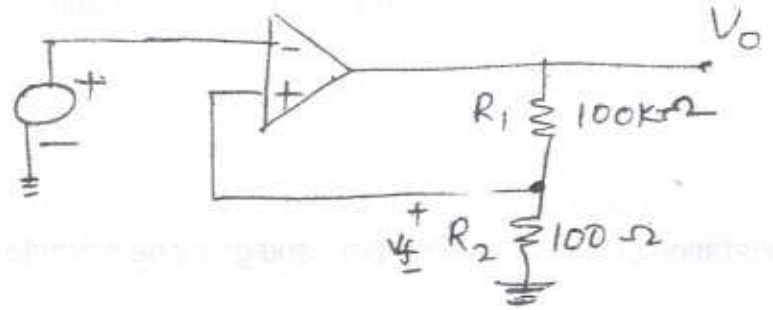
   b) What is 'negative feedback ? And give its advantages. 5

   c) Derive a equation for closed loop voltage gain for voltage – series feedback amplifier. 7

   d) Why are compensating networks are required ? 3

2. a) Draw and explain integrator circuit and draw necessary waveforms. What do you mean by 'practical integrator' ? 7

   b)



   In the above fig. if $\pm V_{sat} = \pm 10V$, find V_{UT} and V_{LT} of $V_i = 6 \sin \omega t$ find the waveform of the output voltage. Why Schmitt trigger is called as Regenerative comparator. 7

   c) With the help of neat circuit diagram and equations, explain the following :

      1) Summing amplifier

      2) Scaling amplifier

      3) Averaging amplifier. 6

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Module – 2

3. a) With the help of diagram, explain briefly series voltage regulator. 4

   b) Explain any two applications of timer 555 in detail. 10

   c) Draw functional block diagram of regulator IC 723. Explain the design of IC 723 as low voltage regulator, along with circuit diagram and equations. 6

4. a) Explain working of timer 555 in astable mode. Draw the circuit and derive necessary equations. 7

   b) Explain working principle and basic operation of PLL with the help of block diagram. 5

   c) Describe in detail any two applications of PLL. 8

Module – 3

5. a) Draw the circuit diagram of a TTL gate with Totem – pole output driver and explain its operation. What is the use of clamping diodes in TTL gate ? 8

   b) Compare the characteristics of following Digital IC logic families. 6

      1) RTL

      2) DTL

      3) HTL.

   c) Explain the operation of CMOS inverter gate and give one advantages of CMOS inverter. 6

6. a) Explain with diagram, working of RTL 2-input circuit. State its advantages and disadvantages. 8

   b) Define the following current and voltage parameters of digital IC

      1) Low level input voltage

      2) High level input voltage

      3) High level supply current

      4) Low level output current. 4

   c) Draw the circuit diagram of an ECL OR/NOR gate and explain its operation. Discuss why ECL is the fastest of all logic families. 8

Module – 4

7. a) Define the following specification of A/D converter :

   1) digital output format

   2) Input impedance. 2

   b) A 8-bit weighted resistor DAC produces an O/P voltage of 2.0 V for an i/p of 00110110. What will be value of V_{out} for an input code.

   1) 11000001 2) 00011100. 8

   c) Explain an ADC using voltage to frequency conversion. Sketch necessary output waveforms. 8

   d) A D/A converter has a full scale analog output of 10 V and accepts 6 binary bits as input. Find the voltage corresponding to each analog step. 2

8. a) Draw the circuit diagram of 4-bit R-2R binary ladder D/A converter. Given logic '1'=10 V and logic '0' = 0 V, $R_F = 10\,k\Omega$, $R = 10\,k\Omega$. Calculate the output voltages, when input are

   1) 1001

   2) 1100. 6

   b) Explain the working of successive approximation A/D converter, with a diagram. 8

   c) A 4-bit DAC is shown in below fig. and has its logic levels given by $V_{high} = 5V$ and $V_{low} = 0$ V. Calcualte the o/p voltages when digital inputs DCBA are given by

   1) 1011 2) 1010. 6