Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS / B.TECH (IT) / SEM-3 / EC-311/ 2010-11

2010-11

ELECTRONIC SYSTEM DESIGN

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) A band-pass filter is narrow band if

a) Q = 10 b) Q < 10

c) Q > 10 d) Q = 1.

ii) The value of slew rate for an ideal Op – Amp is

a) 0 b) 1

c) ∞ d) less than unity.

iii) An instrumentation amplifier

a) is a differential amplifier

b) has a gain less than 1

c) has very high output impedance

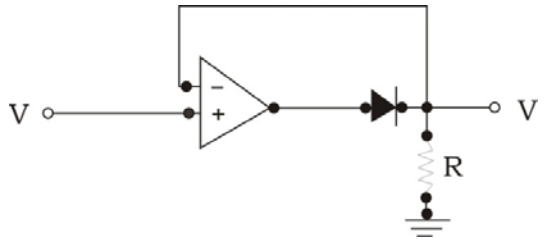
d) has low CMRR.

iv) The circuit which determines whether an input is between two threshold levels is called

a) peak detector b) window detector

c) phase detector d) zero-crossing detector.

v) The circuit shown below works as



a) amplifier b) Schmitt trigger

c) inverter d) halfwave rectifier.

vi) A second order high-pass filter has a roll-off rate

a) – 20dB/decade b) + 20dB/decade

c) – 40dB/decade d) + 40dB/decade.

vii) A Butterworth filter has

a) flat passband, ripple stopband

b) flat passband, flat stopband

c) ripple passband, ripple stopband

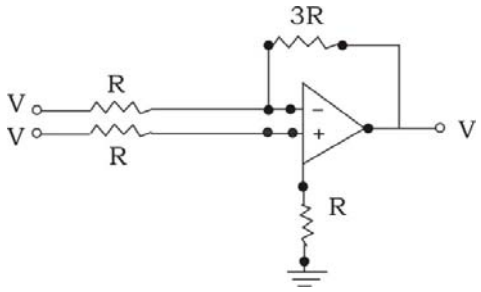
d) ripple passband, flat stopband.

viii) To avoid false triggering of the NE 555 timer, the RESET Pin (Pin 4) is generally connected to

a) Pin 8 b) Pin 1

c) Pin 3 d) No connection (NC).

ix) The value of V_0 in the figure below is



a) $-3V_1 + 0\ 5V_2$ b) $-3V_2$

c) $1\ 5V_2 - 2\ 25V_1$ d) $2V_2 - 3V_1$.

x) Ability of an Op – Amp to provide sufficient differential mode signal but to reject the common mode signal is given by

a) closed loop gain b) open loop gain

c) CMRR d) PSRR.

xi) If $A_d = 3500$ and $A_c = 0 \cdot 35$, the CMRR is

a) 1225 dB b) 10000 dB

c) 80 dB d) both (b) and (c).

xii) In series voltage regulator the pass transistor acts as

a) a CE-amplifier b) a CB-amplifier

c) an emitter follower d) a switch.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Draw the circuit diagram and explain the operation of the window comparator.

3. Define the following electrical parameters :

   Input bias current, input offset current, input offset voltage, CMRR and slew rate.

4. Draw the circuit of a voltage to current converter if the load is (i) floating and (ii) grounded. Is there any limitation on the size of the load when grounded ?

5. Explain how to get the square and square root of a given analog signal.

6. Explain the operation of 555 timer as an astable multivibrator producing the waveform of 50% duty cycle.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. Draw the circuit of a lowpass second order active filter. Analyze the circuit and derive the gain-frequency relation. Design the circuit for gain 2 and cut-off frequency 1 kHz.

8. Set up a computer simulation to solve the differential equation, $d^2v/dt^2 + 2v - 5\sin wt = 0$,

   where, $v(0) = -1, dv/dt = 0$ at $t = 0$.

9. Draw the circuit of an Instrumentation Amplifier and derive the expression of voltage gain. With the help of a transducer bridge how do the instrumentational amplifiers monitor the environmental change ?

10. Draw and explain the Wien-bridge oscillator circuit. Find out the expression for the operating frequency.

11. Write short notes on any *three* of the following :

i) Phase Shift Oscillator

ii) Log Amplifier

iii) Differentiator

iv) Square wave generator.

==========