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## NEELKANTH INSTITUTE OF TECHNOLOGY

B.Tech ECE (Semester IV)

SESSIONAL EXAMINATION I 2014-2015

ELECTRONICS CIRCUITS (NEC-402)

Time: 1:30 Hours

Total Marks 30

**NOTE:** - i. be precise in your Answer

ii. All section are compulsory

### SECTION A

1. Attempt all the Questions: **1X10=10**

(a) The output of an OPM is 2V peak. The slew rate is 5V/us.

The input sinusoidal which can be reproduce with no distortion has the maximum frequency of

- i. 398 Hz
- ii. 1452 Hz
- iii. 125 KHz
- iv. 398 KHz

(b) A buffer amplifier has a Gain of

- i. Infinite
- ii. Unity
- iii. Zero
- iv. None of these

(c) Ideal OPM has gain of -100. The input connected to the inverting end and input resistance is 1K-Ohm. The feedback resistance is

- i. 10 Ohm
- ii. 100K-ohm
- iii. 100 ohm
- iv. 1000 ohm

(d) A differential amplifier having CMRR 25000 has a difference mode gain \_\_\_\_\_. If the common mode gain is 40u

- i. 1
- ii. 0.01
- iii. 0.1
- iv. 0.001

(e) A differential amplifier has a common mode gain of 0.002. It has +200mV signal applied to each of its input. The amplitude of the output signal is

- i. 4mV
- ii. 0V
- iii. 8mV
- iv. None of these

(f) For the linear operation of the OPM , its require that

- i. Output voltage should be 2-3 V lower than power supply.
- ii. Output voltage should be equal to power supply
- iii. Output voltage should be 2-3 Volt greater than power supply
- iv. None of these

(g) Transfer characteristics of OPM is

(h) In NMOS Pinch-off occurs at

- i.  $V_{gs} - V_t = V_{ds}$
- ii.  $V_{gs} > V_t$
- iii.  $V_{gs} = V_{ds} + V_t$
- iv. None of these

(i) Trans-conductance for the MOSFET

- i.  $\partial I_d / \partial V_{GS}$
- ii.  $\partial I_d / \partial V_{ds}$
- iii.  $\partial V_{GS} / \partial I_d$
- iv.  $\partial V_{ds} / \partial I_d$

(j) Input offset voltage in OPM due to

- i. Mismatch in transistor parameter
- ii. Voltage irregularity
- iii. Ground is not perfect
- iv. None of these

### SECTION B

2. Attempt any Five Question : 2X5=10

- (a) Find the close loop voltage gain of the inverting amplifier shown in figure below in term of its CMRR. Assume  $V_1 = V_2$  in so far as the common mode gain is concerned.

(b) Find an expression for the output voltage  $V_o$  of the amplifier circuit shown below. Assume ideal OPM. What mathematical Operation Circuit perform?

(c) Find the input impedance of the inverting amplifier.

(d) The output of the OPM is

(e) Write down the characteristics of ideal OPM.

(f)  $I_d$ - $V_{ds}$  Characteristics of NMOS and also the trans-conductance curve

(g) Define the slew rate and its impact.

### SECTION C

3. Attempt any Two Questions: 5X2=10

- (a) Derive an expression for differential and common mode gain of difference amplifier.
- (b) Derive an expression for the gain of modified Instrumentation Amplifier.
- (c) Compute the gain of the given circuit.