**Roll No. ……………………………………………………………**

**NEELKANTH INSTITUTE OF TECHNOLOGY**

**B.Tech ECE (Semester IV)**

**PRE UNIVERSITY EXAMINATION 2014-2015**

**ELECTRONICS CIRCUITS (NEC-402)**

***Time: 3 Hours Total Marks 100***

***NOTE: - Attempt all the questions which carry equal marks.***

1. **Attempt any Four Part of the following the Questions: (5X4=20)**

1. Explain the pin configuration Operational amplifier and with the help of equivalent circuit of an operational amplifier and give the reason why input resistance is infinity and output impedance is zero.
2. Explain the block diagram of typical operational amplifier and show the effect of finite open loop gain in inverting and non-inverting mode of operational amplifier.
3. Explain the working of instrumentation amplifier and draw the high frequency model of the operational amplifier with a single time constant.
4. Draw the neat circuit diagram of Operation amplifier as a unity gain amplifier and explain the working of difference amplifier.
5. Design a circuit using op-amp for the given expression

And also explain the working of practical op-amp based integration.

1. Explain CMRR, slew rate, half power Bandwidth and also an op-amp having 106 dB gain at dc and a single pole frequency. Response with F1=2 MHz is used to define a non- inverting amp. With nominal dc gain of 100. Find the 3db frequency. Of the closed loop gain.
2. **Attempt any Four parts of the following Questions: (5X4=20)**

1. Draw the structure of enhancement mode and depletion mode MOSFET. Show the formation of channel in these two mode with their characteristics.
2. i. Explain the VI characteristics equation in terms of W/L.
3. Consider an N-Channel enhancement mode MOSFET with the following parameter, Vtn=0.7V, W=45µm, L=4µm, µn=700cm2/V, tox=450 A ,ᶓox=(3.9)(8.85\*10-14) F/cm. Determine the current when Vgs=2Vtn if the transistor biased in saturation region.
4. i. Explain the parameter of FETs.

ii. Compare Mosfet and BJT.

1. Draw and explain the biasing circuit for a depletion type MOSFET.
2. Draw the high frequency equivalent circuit. Explain the significance of the different element of the circuit.
3. Derive the expression for the voltage gain at low frequency and output resistance of a common source amplifier.
4. **Attempt any two parts of the following Questions: (10X2=20)**
5. i. Explain the Ebers-moll diagram with required equation fot the NPN transistor.

ii.Draw and explain the emitter follower circuit.

Iii.Explain the early effect in BJT.

1. Derive an expression to relate and and calculate the Q point values of for the voltage divider circuit.

R1=9.1K-ohm R2=4.7K-ohm Rd=1k-ohm RE=560 ohm

1. Draw the Hybrid model of BJT with all capacitors. Derive an expression for the low frequency response in CE amplifier in terms of mid frequency gain. Find the poles draw it on the frequency response plot.
2. **Attempt any two parts of the following Questions: (10X2=20)**
3. Explain the working of differential amplifier with active load.
4. Draw the circuit diagram of a CS differential amplifier and derive the expression for its voltage gain and also write the differential and common mode range.
5. (c) Explain the small operation of the BJT differential amplifier and hence show that the differential input resistance Rid is given as Rid = (β+1) (2re+2RE).
6. **Attempt any two parts of the following Questions: (10X2=20)**
7. (i) Describe a voltage amplifier?

(ii) Describe shunt –series feedback?

1. Explain the colpitt’s and Wein bridge oscillator.
2. (i) Explain RC phase shift oscillator.

(ii) Distinguish current feedback and voltage feedback with appropriate circuit.