



(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 131401**

Roll No.

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## B. Tech.

### (SEM. IV) THEORY EXAMINATION, 2014-15 ELECTRONIC CIRCUITS

Time : 3 Hours]

[Total Marks : 100

Note : Attempt all the questions. Each question carries equal marks.

1 Attempt any four parts of the following : **5x4=20**

- (a) A differential amplifier has inputs  $V_1=10$  mV and  $V_2=9$ mV. It has a differential mode gain of 60 dB and a CMRR of 100 dB. Find the percentage error in the output voltage and the error voltage.
- (b) Explain the affect of Finite open loop gain on practical non inverting amplifier.
- (c) What do you understand by virtual ground in op-amp. circuits?
- (d) What is slew rate of an op-amp ? How does it effect the operation of op-amp ?
- (e) Explain input bias current and input offset current for a non ideal op. amp. and give reason for their existence.
- (f) What are the ideal characteristics of OP-AMP?

**2** Attempt any four parts of the following. **5x4=20**

- (a) Draw the structures of enhancement mode and depletion mode MOSFETS. Also explain how it can be used as a voltage controlled linear resistor.
- (b) Develop a small signal model of JFET Device and explain its working.
- (c) Draw the circuit diagram for common source MOSFET amplifier. Derive an expression for voltage gain at low frequencies.
- (d) Discuss the need of biasing. Which type of biasing is preferred for discrete MOSFET circuits and why?
- (e) Draw the high frequency model of MOSFET.
- (f) Characterize the voltage gain and output resistance of common gate MOSFET amplifier.

**3** Attempt any two parts of the following : **10x2=20**

- (a) Draw the hybrid II model of a BJT for common emitter configuration and discuss each component.
- (b) Write down the Ebers-Moll model equation for a junction transistor and sketch the equivalent model. Modify the equations when collector base junction of the transistor is shorted.
- (c) Explain Millers Theorem for high frequency current gain with resistive load.

4 Attempt any two parts of the following. **10x2=20**

- (a) Perform the DC analysis of difference amplifier.
- (b) Explain small signal operation of MOS differential pair. Explain the method for improving CMRR.
- (c) The common mode input to a certain differential amplifier having differential gain of 125 is  $4 \sin 200 \pi t$  V. Determine the common mode output if CMRR is 60 dB.

5 Attempt any two parts of the following. **10x2=20**

- (a) Draw and explain the general feedback structures and explain the properties of negative feedback.
  - (b) Derive the expressions for voltage gain, input resistance and output resistance with feedback for series shunt feedback amplifier.
  - (c) Explain the working of Wien Bridge Oscillator using transistor. Derive the expression for feedback factor ( $\beta$ ) and frequency ( $f$ ).
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