D 51485 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2008

EC 04 305—ELECTRONIC CIRCUITS—I

(2004 admissions)

Time : Three Hours **Maximum : 100 Marks**

Answer **all** *questions.*

1. **(a)** Explain base width modulation in transistors.
   (b) Sketch and explain common-emitter output characteristics of a PNP transistor.
   (c) Differentiate enhancement MOSFET from Depletion MOSFET.
   (d) Explain transfer curve of N-channel depletion type MOSFET.
   (e) Derive an expression for voltage gain of an emitter follower.
   (f) Write short note on early effect in transistors.
   (g) Explain Nyquist criterion for stability with regard to stability of feedback amplifiers.
   (h) Give a neat sketch of UJT characteristics and mark all the regions.

   (8 × 5 = 40 marks)

2. **(a)** Express common-base *h*-parameters in terms of common emitter parameters.

   Or

   (b) (i) Draw a general equivalent *h*-parameter model of a transistor amplifier and derive expression for current amplification (Ai) and voltage gain (Av).

   (9 marks)

   (ii) Neatly sketch common emitter characteristics of a PNP transistor. (6 marks)

3. (a) (i) With a neat diagram of the structure, explain the operation of JFET. (9 marks)

   (ii) Calculate the following for a JFET with $V_P = -4V$, $I_{DSS} = 2.5$ mA, $V_{GS} = -2$ V.

   (i) g_{mo}.
   (ii) Drain to source current, ID.
   (iii) Transconductance, g_m.

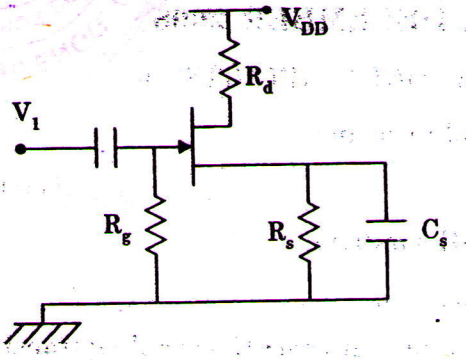
   (6 marks)

   Or

Turn over

(b) (i) Describe the structure of Depletion MOSFET. (7 marks)

(ii)



$V_{DD} = 20V$

$V_P = 3V$

$I_D = 1MA$

$I_{DSS} = 2MA$

For the circuit above calculate the following : (i) V_{GS} ; (ii) g_m ; (iii) R_s ; (iv) R_d for which voltage gain = 24 dB. Assume $r_d >> R_d$. (8 marks)

4. (a) (i) With sketch, explain Hybrid-Pi (π) common-emitter model. (9 marks)

(ii) Write note on Miller's theorem. (6 marks)

Or

(b) Sketch hybrid π and *h*-parameter model at low frequencies of CE configuration. Obtain transconductance input conductance of hybrid-π model in terms of *h*-parameters. (15 marks)

5. (a) Give a detailed account on how feedback amplifiers are categorised.

Or

(b) (i) Draw a voltage series feedback circuit and obtain expression for input and output impedances. (7 marks)

(ii) With figure, explain the working of a Wien-bridge oscillator circuit. (8 marks)

[4 × 15 = 60 marks]