B 2163

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2007.

Third Semester

Electronics and Communication Engineering

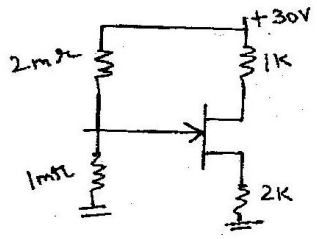
EC 234 — ELECTRONIC CIRCUIT — I

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Determine the operating point 'θ' and locate it on the dc load line for the circuit shown.



2. Briefly explain with circuit diagram diode compensation technique for Ico in BJT.

3. Derive the input impedance of an emitter follower with equivalent circuit.

4. Give the drain current expressions in Triode region and in saturation region of MOSFET.

5. With class C power amplifier circuit define class C operation.

6. A power device is mounted on a heat sink with $\theta_{c-s} = 1°$ C/w $\theta_{J-C} = 7.5°$C/w and $\theta_{C-A} = 5°$C/w. Find the maximum power dissipation of the device when $T_{j\max} = 175°$C.

7. Why gain drops at low and high frequencies?

8. Briefly explain dominant pole high frequency compensation method used in amplifiers.

9. SMPS has an output of 10 V for input fluctuations of 15 V to 25 V.Find the variation of duty cycle of pulse width modulator of the power supply.

10. Draw a simple circuit to control ac signal power using SCR.

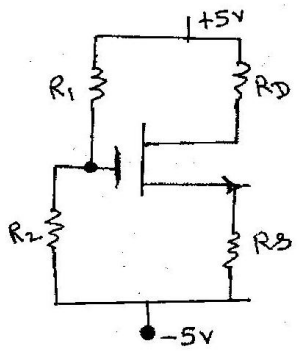
PART B — (5 × 16 = 80 marks)

11. (a) Determine the stability factor for variations of I_{CO}, h_{fe} and V_{Be} of a self Bias circuit used in BJT amplifiers.

Or

(b) (i) Explain constant current biasing used in JFET amplifiers. (6)

(ii) Design a MOSFET biasing circuit shown with following data. (10)



$I_{D\theta}$ = .25 mA

$V_{DS\theta}$ = 4 V

V_{RS} = 1 V

Current through biasing resistors = 20 μA

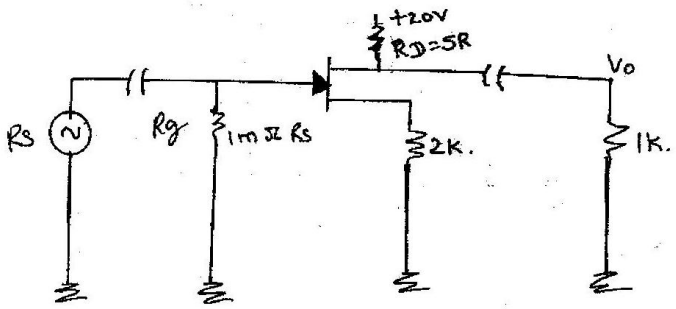
V_{th} = 1.2 V

W/L = 4 and $K_n' = \mu_n C_{ox}$ = 80 μA/V^2.

12. (a) Draw a differential amplifier circuit and its small signal equivalent circuit. Derive its differential gain, common mode gain and CMRR. Suggest a method to improve the CMRR.

Or

(b) (i) Draw the equivalent circuit of the amplifier shown and find its voltage, gain R_{in} and R_o. (10)



Assume r_d = 40 k and gm = 5 mA/V

(ii) Draw a Darlington amplifier and its equivalent circuit. Mention its special features. (6)

13. (a) (i) Explain the working of class B complementary and symmetry power amplifier. Derive its efficiency. How its cross–over distortion can be removed. (12)

(ii) Calculate the efficiency of a class B power amplifier with ac peak to peak voltage at output is 5 V. Assume Vcc = 5 V. (4)

Or

(b) (i) Describe the function of Class A power amplifier with circuit. Derive its efficiency. Also suggest a method to improve its efficiency. (10)

(ii) What is thermal runaway? What are design aspects that have to be taken care of while designing power amplifier to have thermal stability? (6)

14. (a) Explain FWR with π filter and derive the ripple factor of the FWR with π filter.

Or

(b) Describe the regulation of the output voltage with respect to input voltage and load variations of a linear voltage regulator.