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Question Paper Code : 71727

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Third Semester

Electronics and Communication Engineering

EC 6304 – ELECTRONIC CIRCUITS – I

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List out the three stability factor.

2. Find the collector and base current of circuit given in fig 2 hfe = 80, $V_{BE(ON)} = 0.7$ V.

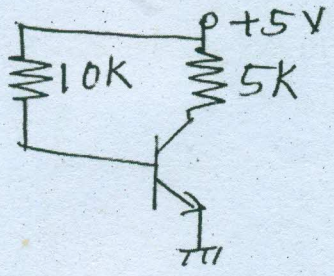

Fig. 2

3. State Miller's theorem.

4. Draw the small signal equivalent of CB configuration.

5. What are the features of BiMOS cascode amplifier?

6. What is the use of source bypass capacitor in CS amplifier?

7. Define rise time. Give the relationship between bandwidth and rise time.

8. Sketch hybrid π equivalent model of the BJT.

9. State the advantages of current steering circuit.

10. Define active load and list the types of active load.

PART B — (5 × 13 = 65 marks)

11. (a) Derive the stability factors for voltage divider bias circuit and give reason why it is advantageous than fixed bias circuit. (13)

Or

(b) (i) Draw a circuit which uses a diode to compensate for changes in I_{CO}. Explain how stabilization is achieved in the Circuit. (8)

(ii) Briefly explain the reason for keeping the operating point of a transistor as fixed. (5)

12. (a) Draw the a.c equivalent circuit of a CE amplifier with voltage divider bias and derive the expression for current gain, voltage gain, Input impedance, output admittance and overall current gain. (13)

Or

(b) Explain the operation of cascade amplifier and derive Voltage gain, overall input Resistance overall current gain and output impedance. (13)

13. (a) Derive gain, input and output impedance of common source JFET amplifier with neat diagram and equivalent circuit. (13)

Or

(b) Draw a common Gate MOSFET amplifier and derive for Av, Ai and Ri using small signal equivalent circuit.

14. (a) Determine the low frequency response of the amplifier circuit shown in Fig. 14 (a) Given data's (13)

$R_s = 680\ \Omega;\ R_1 = 68\ K\Omega; R_2 = 22 K\Omega;$ Re $= 1K\ V_{cc} = 10\ V$

$C_1 = C_2 = 0.1\ \mu F;\ C_E = 10\ \mu F.$

$R_c = 2.2\ K\Omega;.\ R_L = 10\ K\Omega;; \beta = 100,\ hie = r\pi = 1.1k$

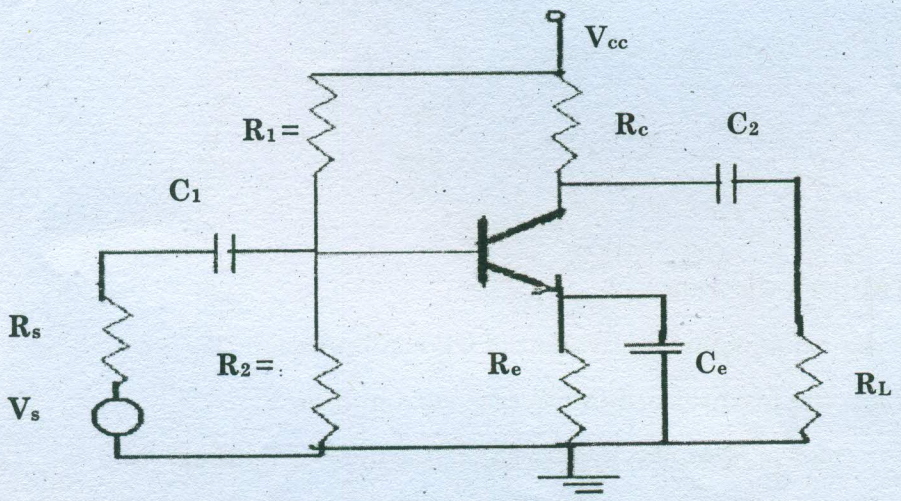

Fig. 14 (a)

Or

(b) Derive expressions for the short circuit current gain of common emitter amplifier at High Frequency. Define alpha cut-off frequency, beta cut-off frequency and transition frequency and derive their values in terms of the circuit parameters. (13)

15. (a) Explain the operation of MOS differential Amplifier with active load and derive for CMRR. (13)

Or

(b) (i) What is an IC biasing? Explain in detail about the MOSFET uses as a constant current source. (8)

(ii) With the analysis, explain about MOSFET current steering circuit. (5)

PART C — (1 × 15 = 15 marks)

16. (a) Find the Midband gain A_M and upper 3 — dB frequency f_H of a CS amplifier fed with a signal source having an internal resistance R_{sig} = 100 $K\Omega$. The Amplifier has RG = 4.7 MΩ, R_D = R_L =15 KΩ, g_m=1 mA/V, r_0=150 KΩ ,C_{gs} = 1pF and C_{gd} = 0.4pF. (15)

Or

(b) Calculate the input and output resistance of the emitter- follower circuit shown in Fig. 16 (b). Assume $R_s = 0.5\ k, r\pi = 3.28\ K\Omega, \beta = 100$ and $r_0 = 100\ K\Omega$.

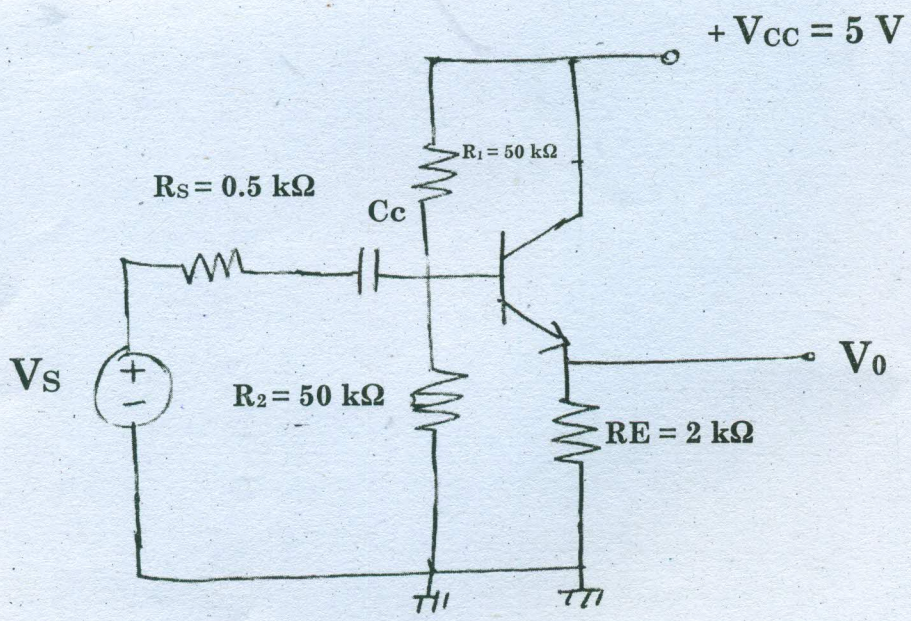

Fig. 16 (b)