SE-ET Sem IV 15/5/15

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AE-II

Q.P. Code : **3610**

(3 Hours) **[Total Marks : 80**

N.B. : (1) Question **No.1** is **Compulsory.**.
(2) Solve any **three** questions from remaining **five** questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) Assume suitable data if necessary and mentain the same in answer sheet.

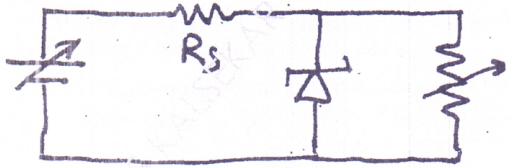
1. (a) Define the CMRR of Differential Amplifier ? Why constant current source biasing is preferred for Differential Amplifier. **20**

(b) What is the major limitations of class B power amplifier and how to overcome the same ?

(c) Draw high frequency hybrid pi equivalent circuit of a BJT and define various components in the model.

(d) Draw the circuit diagram of widlar current source and derive the relationship between output current and referrence current.

(e) A zener voltage regulator as shown below has Vz = 6.2 V. The input voltage varies from 10V to 15V and load current is 50 mA. To hold output voltage constant under all conditions what should be the range of series resistance (Rsmin and Rsmax)
(Izmin = 10 mA , Pz max = 2W)



(f) Draw subtractor using OPAMP and also derive expression for its output voltage

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2. (a) For the circuit shown in **Fig.2a** The transistor parameters are $V_{BE(ON)}$ = 0.7V , β = 100 , Cπ = 2 pf , Cμ = 0.2 pF. **10**
Find lower cut off frequency, higher cut off frequency and bandwidth of circuit.

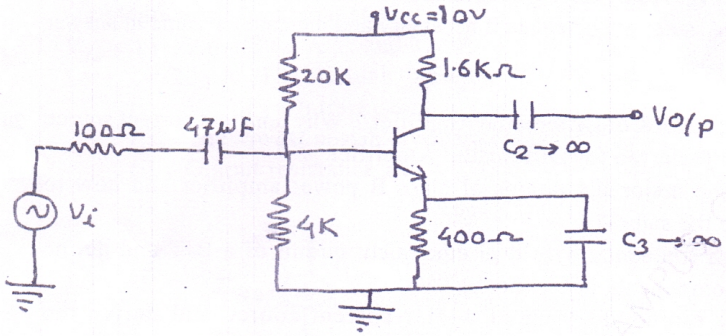

Fig.2a

(b) Draw the circuit diagram of MOSFET based differential amplifier and derive the expression for differential gain, common mode gain and CMRR. **10**

3. (a) For the circuit shown in **Fig.3a** Transistors parameters are Kn = 1m A/V² ,Vtn = 0.7V , Cgs = 2 pF , Cgd = 0.2 pF λ = 0. Find the miller capacitance, mid band voltage gain and upper cut off frequency. **10**

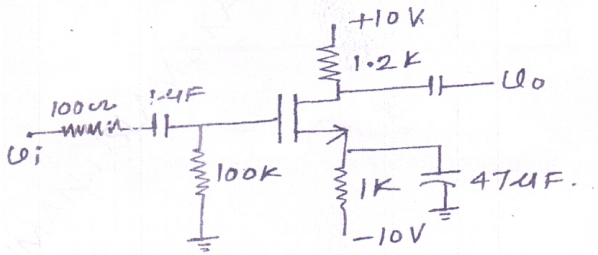

Fig.3a

(b) What are the ideal characteristics of OPAMP and also explain effect of high frequency on OPAMP gain and phase. **5**

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(c) Draw the circuit of V_{BE} multiplier biased class AB amplifier and explain the working and advantages of V_{BE} multiplier biased class AB amplifier. 5

(a) Determine overall input resistance and output resistance of the circuit as shown in **Fig 4a.** For both transiters β =120. 10

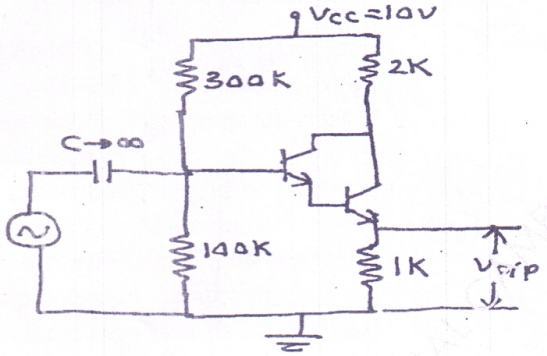

Fig 4a

(b) For the circuit shown in **Fig 4b** transistor parameters are $\beta = 100$, $V_{BE(ON)} = 0.7$ V, VA = ∞. The constant source has a finite output resistance of 100 K. 10

Find : (a) Differential and common mode input resistance.
(b) Find Ad , Ac, and CMRR of the circuit.

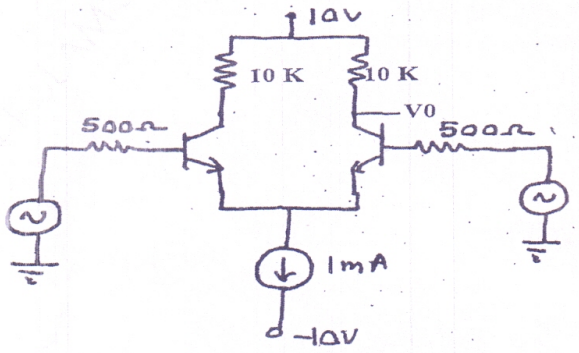

Fig 4b

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5. (a) Draw the circuits of OPAMP based differentiator circuit and derive the expression for output voltage. What are the limitations of ideal differentiator circuit and how to overcome the limitations ? 10

(b) In the MOSFET cascode current source shown in the **Fig.5b** all transistors are identical with parameters. 10
V_{TN} = 1V , Kn = 80 μ A/V^2 and λ = 0.
Let I_{REF} = 20 μA. The circuit is biased at V^+= 5V and V^-= -5V determine
(i) V_{GS} of each transistors.
(ii) The lowest possible voltage value of V_{D4}.
(iii) Output resistance Ro.

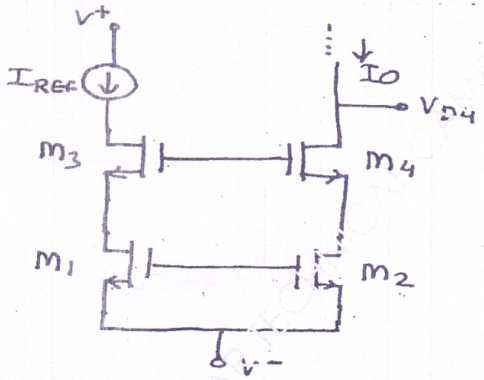

Fig.5b

6. Write short note on (Any three) :- 20
(a) Series voltage regulator
(b) Class AB power amplifier
(c) Active filters
(d) Power MOSFET.
