

17 MAY 2018

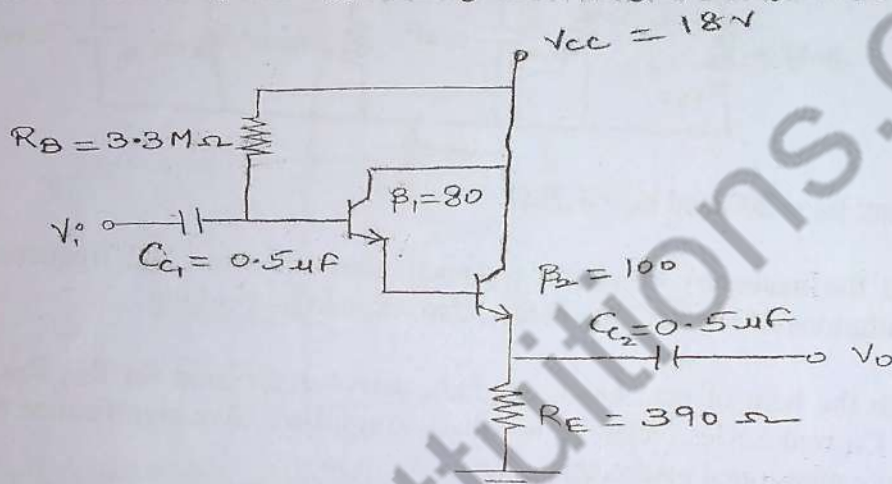
[Total Marks: 80]



- 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 mention the same in answer sheet.

1. Attempt any **Four** of the following: 20

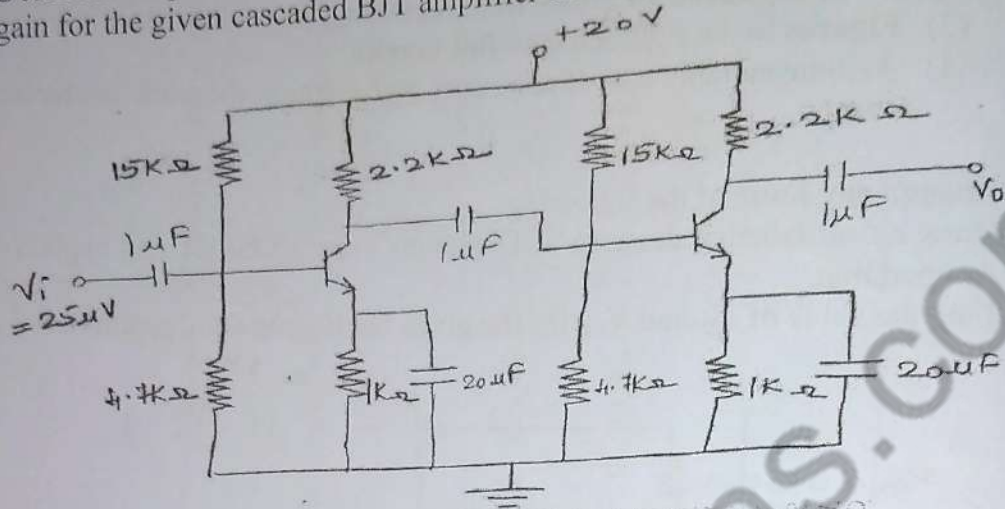
- (a) Draw a neat labelled diagram of Depletion Type MOSFET and explain its operation.  
 (b) Find the value of  $I_E$  and  $V_{CE}$  for the given Darlington-configuration:



Given:  $\beta_1 = 80$ ,  $\beta_2 = 100$ ,  $V_{BE} = 1.6V$ .

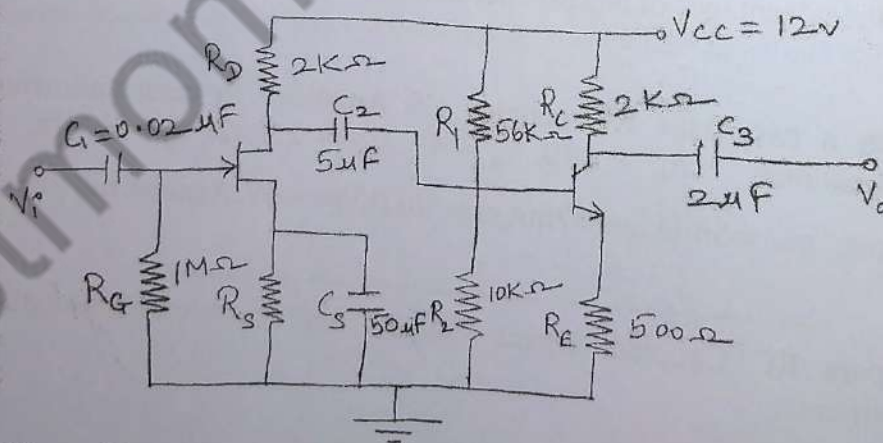
- (c) Differentiate Small Signal Amplifier and Large Signal Amplifier.  
 (d) State Barkhausen's Criteria and explain basic principle of an Oscillator.  
 (e) Give the advantages of negative feedback.
2. (a) Design a two stage RC coupled CS Amplifier to meet following **15** specifications:  $A_v \geq 100$ ,  $V_o = 4V$ ,  $I_{DQ} = 1.2 mA$ ,  $f_L = 20 Hz$ .  
 Assume:  $g_{m0} = 5mS$ ,  $I_{DSS} = 7mA$ ,  $r_d = 50k\Omega$ ,  $V_P = -4V$ . Assume suitable  $V_{DD}$ .  
 (b) Compare RC Coupled, Direct Coupled and Transformer Coupled **05** Amplifiers.

3. (a) Determine input impedance, output impedance, voltage gain and current gain for the given cascaded BJT amplifier as shown in the figure below: 10



Given:  $h_{fe} = 200$  and  $h_{ie} = 1.3k\Omega$ .

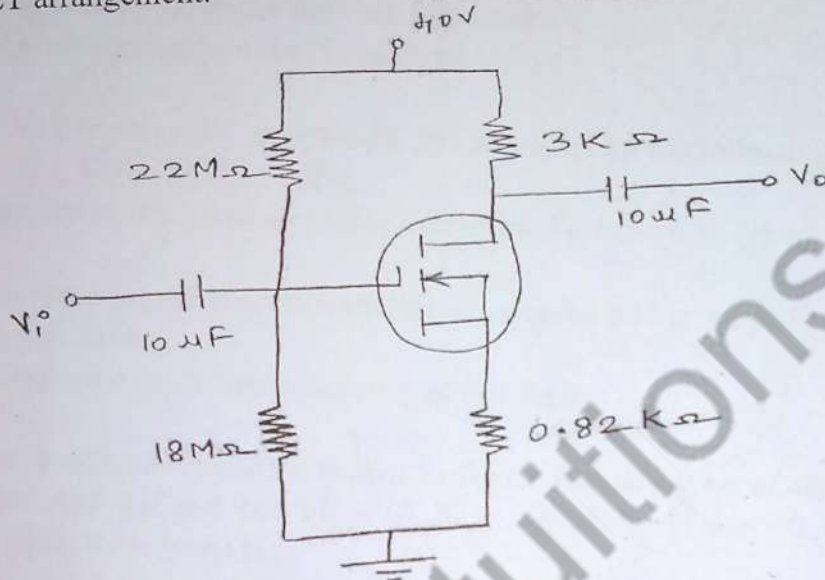
- (b) Find the necessary condition for oscillations to occur and frequency of oscillations of Hartley Oscillator. Also, explain its working. 10
4. (a) With the help of neat block diagram, derive expression for  $R_{IF}$ ,  $R_{OF}$ ,  $G_{mF}$  for Current Series Negative Feedback Amplifier. Give significance of the above mentioned parameters. 08
- (b) For the circuit shown below, determine the following: 12
- $R_s$
  - Q-point of each stage.
  - AC equivalent model.
  - Lower Cut-off Frequency ( $f_L$ ).



Given:  $V_{GS} = -1V$ ,  $I_{DSS} = 8mA$ ,  $V_P = -4V$  for JFET and  $h_{ie} = 1k\Omega$ ,  $h_{fe} = 100$ ,  $V_{BE} = 0.6V$  for BJT.



5. (a) Design an RC phase shift Oscillator to generate 5kHz sine wave with 20V peak to peak amplitude. Assume  $h_{fe} = 150$  and  $h_{ie} = 1k\Omega$ . 10
- (b) Draw circuit diagram of Class B Push Pull Power amplifier and explain its working. Find its maximum efficiency and maximum power dissipation in each transistor. What is cross-over distortion? How it can be overcome? 10
6. (a) Determine  $I_{DQ}$  and  $V_{DSQ}$  for the given network of Enhancement type MOSFET arrangement. 05



Given:  $I_{D(ON)} = 3mA$ ,  $V_{GS(ON)} = 10V$ ,  $V_{GS(Th)} = 5V$ .

- (b) In Colpitts Oscillator,  $C_1 = 0.2\mu F$ ,  $C_2 = 0.02\mu F$ . If the frequency of oscillator is 10 kHz, find the value of inductor. Also, find the required gain for oscillation. 05
- (c) Write a Short Note on: Cascode Amplifier. 10