R07   Set No. 2

I B.Tech Examinations,June 2011
BASIC ELECTRONIC DEVICES AND CIRCUITS
Electrical And Electronics Engineering

Time: 3 hours   Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Explain the formation of depletion region in an open-circuited p-n junction with neat sketches.

   (b) A p-n junction diode has a reverse saturation current of 30 μA at a temperature of 125 ^{0}C. At the same temperature find the dynamic resistance for 0.2V bias in forward and reverse direction.   [8+8]

2. (a) Draw the circuit of a BJT in C.E configuration and explain about the input and output characteristics.

   (b) Derive the relation between α and β.   [10+6]

3. Take into account the loading of the RC network in the phase shift oscillator shown in figure 4 If R_0 is the output impedance of the amplifier (assume that Cs is arbitrarily large) prove that the frequency of oscillation f and the minimum gain A are given by   [16]

$$f = \frac{1}{2\pi RC} \frac{1}{\sqrt{6+4(\frac{R_o}{R})}}$$

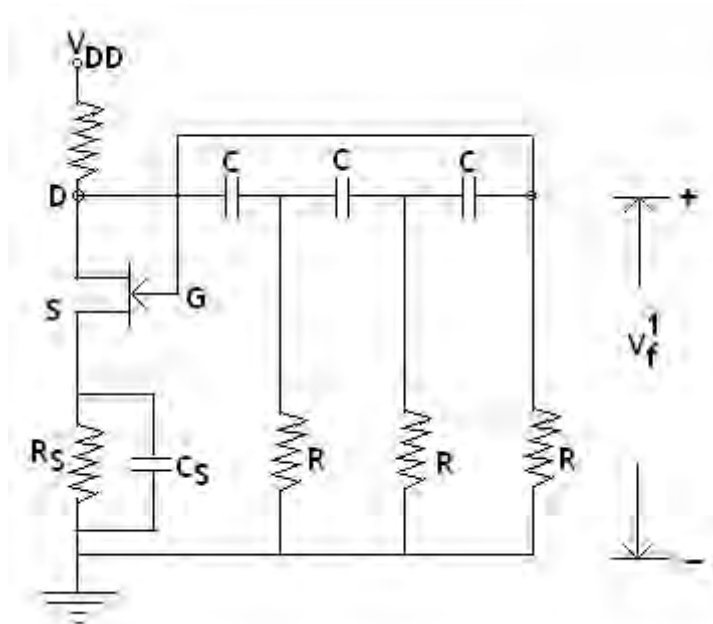$$A = 29 + 23\frac{R_o}{R} + 4\left(\frac{R_o}{R}\right)^2$$

Figure 4

4. (a) What do you understand by dc and ac load line? Explain how to choose the operating point?

(b) For a fixed bias configuration, determine I_{bQ}, I_{CQ} and V_{ceQ} using the following specifications: V_{cc}= 16V, β =90, R_c = 2.7KΩ, R_b=470KΩ and also find the saturation current Isat. [8+8]

5. Show that for the CG amplifier with Rs=0 and Cds=0
$$y_i = g_m + g_d(1 - A_V) + jwC_{gs}$$ [16]

6. (a) Discuss the operation of a FW rectifier with and without capacitor filter.

   (b) Calculate the magnitude of the ripple factor for the given set of observations of V_{ac} =24.2volts and V_{DC}=20 volts. Identify the type of rectifier circuit based on the knowledge of theoretical values of ripple factors for Half wave and Full wave rectifier circuits. [8+8]

7. (a) With the help of a block schematic, explain the working of a CRO and what are the applications of CRO?

   (b) In a CRT, a pair of deflecting plates are 2.5 cm long and 0.5 cm apart. The distance from the centre of the plates to the screen is 20 cm. The final anode voltage is 1200V. Calculate:

   i. The displacement produced for a deflecting voltage of 20V

   ii. The angle, which the beam makes with the axis of the tube on emerging from the field. [10+6]

8. (a) Define Desensitivity D. What is the significance of this?

   (b) An amplifier without feedback gives a fundamental output of 36V with 7 percent second-harmonic distortion when the input is 0.028V. If 1.2 percent of the output is fed back into the input in a negative voltage series feedback circuit, what is the output voltage? If the fundamental output is maintained at 36V but the second-harmonic distortion is reduced to 1 percent, what is the input voltage? [6+10]

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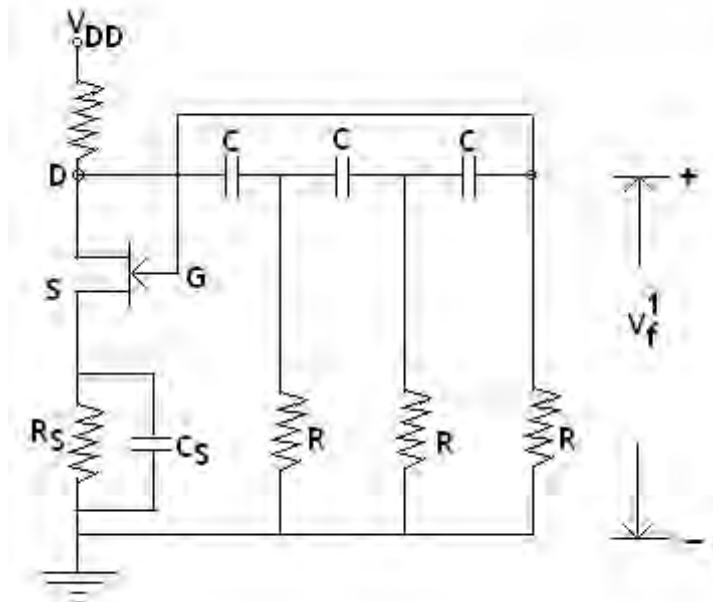

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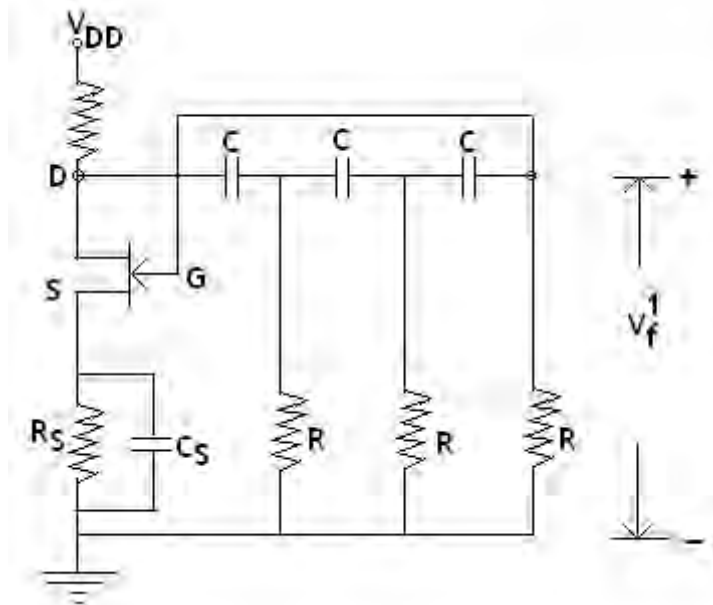$$A = 29 + 23\frac{R_o}{R} + 4\left(\frac{R_o}{R}\right)^2$$

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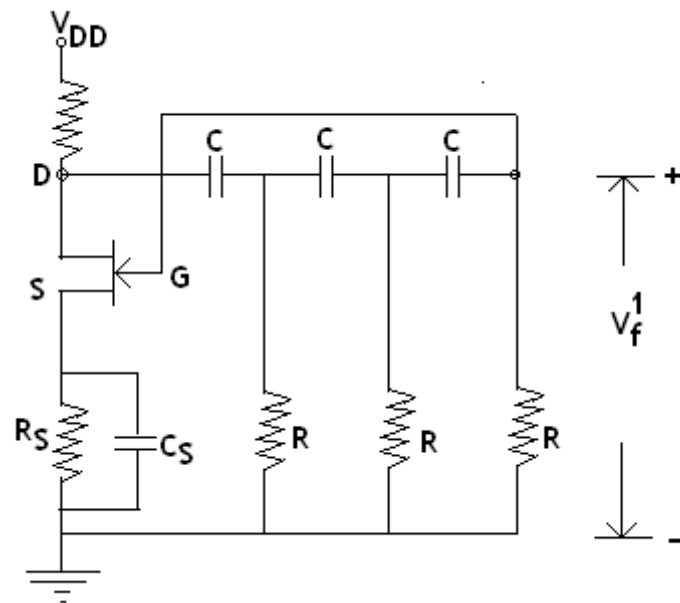 $A = 29 + 23\frac{R_o}{R} + 4\left(\frac{R_o}{R}\right)^2$

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