COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Government of Maharashtra.)
SHIVAJI NAGAR, PUNE - 411 005

END Semester Examination

ET-201- Electronic Devices and Circuits

Course: B.Tech

Branch: Electronics and TeleCommunication Engineering

Semester: Sem III

Year: 2014-2015

Max.Marks:60

Duration: 3 Hours Time:- 10.00 am to 1.00pm

Date:30/11/2014

Instructions:

MIS No. | | | | | | | | | | |

1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of anything like stationery, calculator is not allowed.
5. Assume suitable data if necessary.
6. Write your MIS Number on Question Paper

Q.1 a] State Mass Action law and explain it in detail. [4]

b] In a P-type semiconductor, the Fermi-level lies 0.4eV above the valence band. If the concentration of acceptor atoms is tripled, find the new position of Fermi-level. Assume kT = 0.03eV [3]

c] What are the two types of capacitances across a P-N Junction? Explain them in detail. [4]

d] The reverse saturation current of a silicon diode is 5 mA at room temperature. Find the diode current at [4]

i) 40^0 C and forward voltage of 0.3 V,
ii) 60^0 C and a forward voltage of 0.5 V. Assume $\eta = 2$.

Q.2 a] Draw the drain and transfer characteristics of p-channel D-MOSFET. [2]

b] For the circuit shown in figure 1, find [5]

i) I_{DQ}
ii) V_{GSQ}
iii) V_{DS}
iv) V_D
v) V_S

Given: $I_{D(on)} = 5$ mA at $V_{GS} = 6$ V and $V_{GS(Th)} = 3$ V.

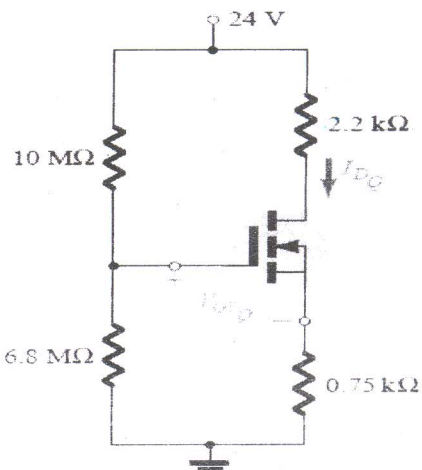

Figure 1

OR

b] With the help of neat diagram explain different current components in BJT. Define α_{dc} and β_{dc} and derive relation between them. [5]

c] A DC analysis of network in figure 2 will result in V_{GSQ} = -2.2 V and I_{DQ} = 2.03 mA [8]

i) Determine g_m.
ii) Find r_d.
iii) Determine Z_i with and without r_d. Compare results
iv) Calculate Z_0 with and without r_d. Compare results
v) Determine V_o with and without r_d. Compare results

Given: I_{DSS} = 10 mA, V_P = - 4 V and y_{os} = 50 µS

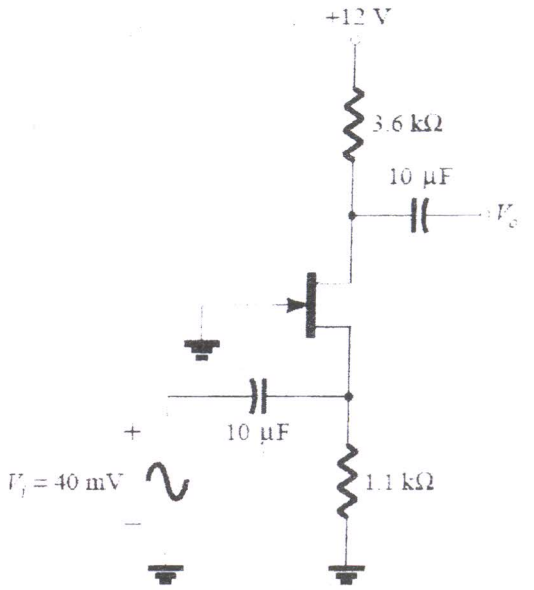

Figure 2

Q.3 b] The amplifier shown in figure 3 uses a transistor with the following parameters: [9]
h_{ie} = 1.1 kΩ, h_{fe} = 50, h_{re} = 2.5 x 10^{-4} and h_{oe} = 25 x 10^{-6} µA/V. Calculate:
i) A_I ii) A_{IS} iii) A_V iv) A_{VS} v) $R_o{}^1$ and $R_i{}^1$

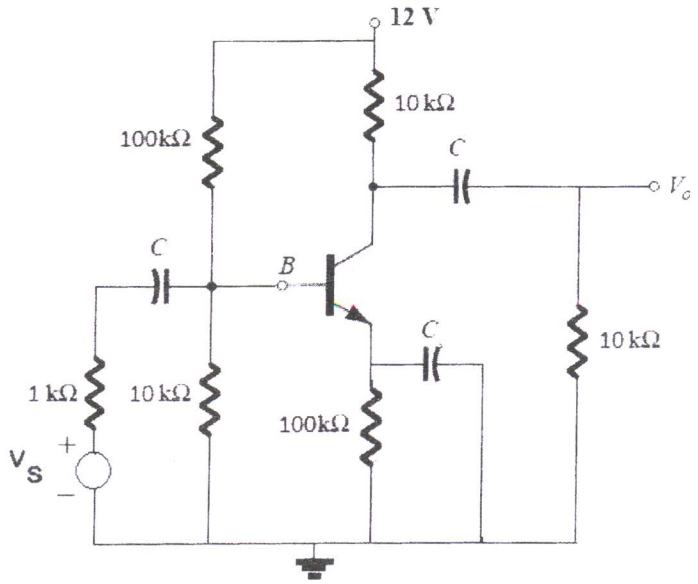

Figure 3

c] What are different coupling methods for multistage BJT amplifier? Explain them with their advantages and disadvantages. [6]

Q.4 a] A class B push pull amplifier supplies power to a resistive load of 12 Ω. The output transformer has a turns ratio of 3:1 and efficiency of 78.5%. Calculate [5]
i) Maximum power output
ii) Maximum power dissipation in each transistor
iii) Maximum base and collector current for each transistor.
Assume h_{fe} = 25 and V_{CC} = 20 V.

b] With the help of neat diagram explain the working of class AB push pull amplifier. [5]

how negative feedback improves bandwidth of an amplifier.

d] A negative feedback is used to reduce the noise from an amplifier by 80% [2]

i) What must be the percentage of negative feedback to accomplish this, if the input voltage gain is 100?

ii) What will be the voltage gain with feedback?