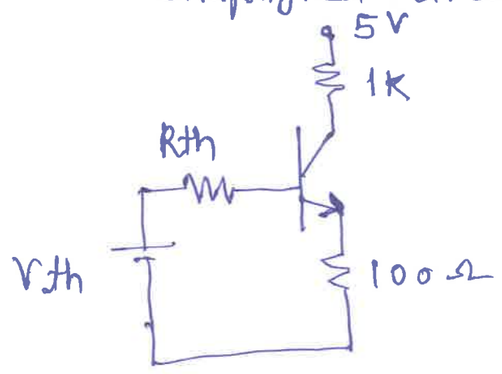
Solution. Q.P. Code : 36426

(1)

Que 2b :

Simplified circuit



$R_{th} = R_1 || R_2$

$= 1.2K\Omega$

$V_{th} = \frac{R_2 V_{CC}}{R_1 + R_2}$

$= 1V$

KVL to Input loop

$V_{th} - I_B R_{th} - V_{BE} - (1+\beta) R_E = 0$

Solving

$$I_B = \frac{1 - 0.7}{1.2 \times 10^3 + (101)(100)}$$

$\therefore I_B = 26.54 \mu A$

let circuit is operating in Active region

$\therefore I_C = \beta I_B$

$= 2.65 mA$

Applying KVL to O/P loop

$V_{CC} - I_C R_C - V_{CE} - I_E R_E = 0$

Solving $V_{CE} = 2.17 V$

02 Q.P. Code: 36425

Que 3 a :

$$K = \frac{I_{D(ON)}}{[V_{GS(ON)} - V_{GS(Th)}]^2}$$

$$\therefore K = \frac{3 \times 10^{-3}}{[10-5]^2}$$

$$K = 1.2 \times 10^{-4} \ A/V^2$$

$$I_{DQ} = K[V_{GS} - V_{GS(Th)}]^2 \quad \text{---- (1)}$$

but $V_{GS} = V_G - I_D R_S$

$$= \frac{R_2 V_{DD}}{(R_1 + R_2)} - I_D R_S$$

$$\therefore V_{GS} = 18 - 820\, I_D \quad \text{---- (2)}$$

$\therefore$ from equ^n (1)

$$I_{DQ} = 1.2 \times 10^{-4}[18 - 820\, I_D - 5]^2$$

Solving $I_D = 6.69$ mA & $I_D = 37.4$ mA

$\therefore$ Selecting $I_D = 6.69$ mA

from equation (2) $V_{GSQ} = 12.51$ V

Apply KVL to o/p loop.

$$V_{DSQ} = V_{DD} - I_D(R_D + R_S)$$

$$V_{DSQ} = 14.44 \text{ V}$$