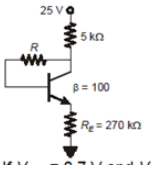
MSMF GATE CENTRE

ANALOG CIRCUITS - 2

1. Which configuration of the transistor is used as an impedance transformer ?

   a) Common base b) Common collector c) Common emitter d) Cascade connection

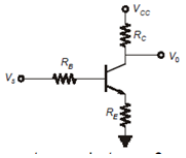
2. Consider the circuit shown below



   If $V_{BE} = 0.7$ V and $V_{CE} = 5V$ then the value of R is

   a) $6.34M\Omega$ b) $5.97k\Omega$ c) $5.97M\Omega$ d) $6.34k\Omega$

3. A small resistance R_E is introduced in a common emitter bipolar junction transistor amplifier.



   $g_m =$ transcoductance, $\beta =$ current gain

   Which of the following statements is not true ?

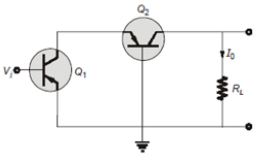
   a) The small signal voltage gain from collector to base is reduced by a factor of $(1+g_m R_E)$

   b) High frequency response is significantly improved.

   c) The overall gain dependency on β is less

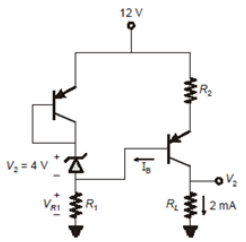
   d) Input resistance remains same.

4. In the 2 stage amplifier circuit shown in figure, if the transconductance of transistor Q_1 and Q_2 are g_{m_1} and g_{m_2} respectively, the overall transconductance $g_{m0} = \frac{I_0}{V_1}$ is

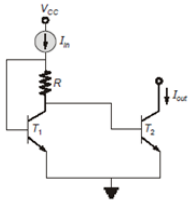


   a) $g_{m_0} \equiv g_{m_1}$ b) $g_{m_0} \equiv g_{m_2}$ c) $g_{m_0} = g_{m_1} + g_{m_2}$ d) $g_{m_0} = g_{m_1} - g_{m_2}$

5. For the given circuit shown below, $\beta = 100$ for both transistor $V_{EB} = 0.7V$ and $I_z = 5mA$. The value of R_1 is _____ $k\omega$



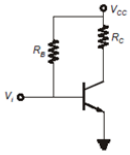
6. In the figure shown below



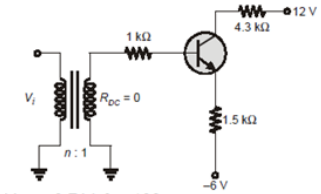
Assuming $V_T = 25mV$ and $I_{in} = 2mA$, then the value R that should be used in the circuit so that the output current is half of the input current is _____ Ω

(Assume both the transistors to be identical and β of the transistors to be high)

7. Consider a fixed blased circuit with a Q point (9.2 mA, 3.4V). The transistor has a DC current gain of 115. Given that $V_{BE} = 0.7$ volts and $V_{CC} = 5Volts$. The value of base resistance is _____ $k\Omega$



8. In the circuit shown below the transformer and transistor are ideal



V_{BE} = 0.7 V, β = 100

The stability factor 'S' will be

a) 1.5 b) 1.66 c) 1.33 d) 1

9. For an $n-p-n$ BJT, the following parameters are given

$g_m = 40mAN$

$C_\mu = 2\times10^{-14}F$

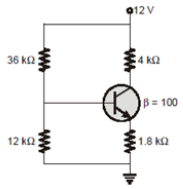
$C_\pi = 4\times10^{-13}F$

Magnitude of midband DC current gain = 100

The β cut-off frequency f_β is

a) 0.152 GHz b) 15.2 GHz c) 0.95 GHz d) 0.019 GHz

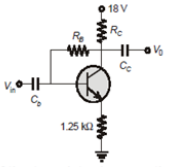
10. A Si transistor is biased in potential divider configuration as shown below.



If β is increased by 100%, then I_C will be

a) Increased by 4.8% b) Decreased by 5.7% c) Increased by 2.9% d) Increased by 1.0%

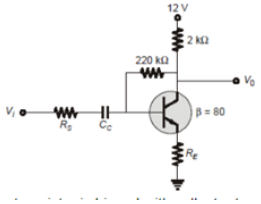
11. In the circuit shown below, transistor has a current gain of 200 and base to emitter voltage 0.7 V.



If the transistor is operating at (10V, 2mA) then the resistance R_C required is

a) $2.73k\Omega$ b) $5.20k\Omega$ c) $1.92k\Omega$ d) $3.46k\Omega$

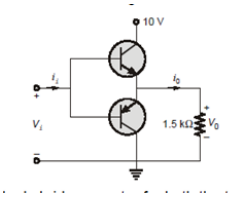
12. Consider the diagram given below



If the transistor is biased with collector to emitter voltage of 5V, then the value of R_E required is (Assume $V_{BE} = 0.7V$)

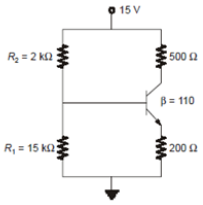
a) $2.42k\Omega$ b) $4.84k\Omega$ c) $1.86k\Omega$ d) $5.92k\Omega$

13. Consider the circuit given below



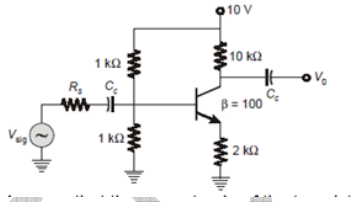
The hybrid parameter for both the transistors are same, $h_{io} = 1.2k\Omega$, the $h_{i0} = 99$, h_{10} & h_{00} are negligible. The current gain i_0 / i_1 is _____

14. Consider the circuit shown below



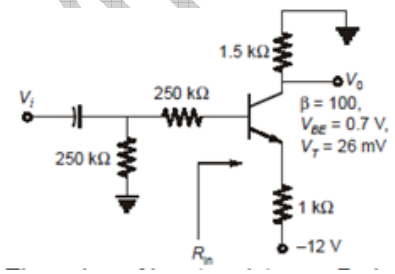
It was found later after calculations that because of a poor solder joint, resistor $R_1 = 15k$ become open circuit. Assuming $V_{CE(sat)} = 0$, $V_{BEQ} = 0.7V$ and $I_{CQ} \approx I_{EQ}$ the change in the I_{CQ} between the two cases will be _____ mA

15. Consider the amplifier circuit shown below



Assume that the current gain of the transistor is very large, then the modulus of the voltage gain of the amplifier is _____

16. Consider the circuit given below



The value of input resistance R_{in} is _____ $k\Omega$

Answers :

1.b	2.c	3.d	4.a	5. 1.45 (1.20 – 2.00)	6. 8.66 (7.80 – 9.10)
7. 53.75 (53.50 – 54.00)		8. b	9. a	10. c	11. a
12. a	13. 100 (99.90 – 100.10)		14. 0	15.5	
16. 102.38 (102.00 – 102.50)					