

8. An n channel D-MOSFET with a positive V_{GS} is operating in 1 1 2 2
 (A) Depletion mode (B) Enhancement mode
 (C) Cut off (D) Saturation
9. If the output of an amplifier is 10 V and 100 mV from the output is feedback to the input then feedback fraction is 1 2 3 2
 (A) 10 (B) 1
 (C) 0.01 (D) 15
10. The gain of an amplifier without feedback is 100dB. If a negative feedback of 3 dB is applied, the gain of the amplifier will become 1 2 3 3
 (A) 5 dB (B) 300 dB
 (C) 103 dB (D) 97 dB
11. Oscillators have 1 1 3 2
 (A) No feedback (B) Negative feedback
 (C) Positive feedback (D) Either positive or negative feedback
12. The feedback factor β at the frequency of oscillation of a wein bridge oscillator is 1 1 3 2
 (A) 3 (B) $1/3$
 (C) $1/29$ (D) $3/29$
13. The conversion efficiency of a class C amplifier is 1 2 4 3
 (A) 50% (B) 78.5%
 (C) Larger than 78.5% (D) Lesser than 78.5%
14. For a perfect power amplifier output power rating will be _____ 1 1 4 2
 if the output impedance is halved.
 (A) Halved (B) Squared
 (C) Doubled (D) Square rooted
15. What is the maximum efficiency of a class A circuit with a direct or series fed load connection? 1 2 4 3
 (A) 90% (B) 78.5%
 (C) 50% (D) 25%
16. Class _____ amplifiers are normally operates in a push pull configuration in order to produce an output that is a replica of the input 1 1 4 3
 (A) A (B) B
 (C) C (D) AB
17. For BJT, two transistor current source of values $\beta_1, \beta_2 = 75$ and $I_{REF} = 0.62mA$, the load current I_O is 1 2 5 2
 (A) 1.2 mA (B) 2 mA
 (C) 0.42 mA (D) 0.60 Ma
18. The increased r_o of the Wilson current source is due to 1 2 5 3
 (A) Negative feedback (B) Positive feedback
 (C) Cascade configuration (D) Stable bias current

19. The ability of a differential amplifier to reject a common mode signal is 1 1 5 3
 (A) Differential mode gain (B) Common mode rejection ratio
 (C) Differential mode rejection ratio (D) Common mode gain ratio

20. A MOSFET based two transistor current source has $I_{ref} = 100\mu A$ and $\lambda = 0.01V^{-1}$, then the output resistance is 1 2 5 3
 (A) $1k\Omega$ (B) $1m\Omega$
 (C) $10m\Omega$ (D) $10k\Omega$

PART – B (5 × 4 = 20 Marks)

Answer ANY FIVE Questions

- | | Marks | BL | CO | PO |
|---|-------|----|----|----|
| 21. What is DC load line? How is Q point plotted on the DC load line? | 4 | 2 | 1 | 2 |
| 22. Sketch the small signal equivalent circuit of NMOS and write the formula for g_m and r_o . | 4 | 2 | 2 | 3 |
| 23. Compare voltage series and current shunt feedback amplifier topologies. | 4 | 2 | 3 | 3 |
| 24. Construct an amplifier which conducts for less than 180° of the given input signal. | 4 | 3 | 4 | 3 |
| 25. Sketch the basic three transistor current source. | 4 | 2 | 5 | 2 |
| 26. Calculate the corner frequency and maximum gain of a bipolar common emitter circuit with a coupling capacitor. Given $V_{BE(ON)} = 0.7V$, $R_{si} = 0.1k\Omega$, $\beta = 100$, $V_A = \infty$, $I_{CQ} = 1.81mA$, $R_1 = 51.2k\Omega$, $R_2 = 9.6k\Omega$, $R_c = 2k\Omega$, $R_E = 0.4k\Omega$ and $C_1 = 1\mu F$. | 4 | 3 | 2 | 3 |
| 27. Define g_m , r_π and r_o of BJT amplifier. | 4 | 3 | 1 | 3 |

PART – C (5 × 12 = 60 Marks)

Answer ALL Questions

- | | Marks | BL | CO | PO |
|--|-------|----|----|----|
| 28. a. A CE amplifier is fed with the voltage source V_s of internal resistance $R_s = 500\Omega$, $R_1 = 47k\Omega$, $R_2 = 5k\Omega$, $R_c = 4.7k\Omega$ and $R_E = 500\Omega$. The transistor parameters are $\beta = 100$, $V_{BE} = 0.7V$, $V_A = \infty$ and $V_{cc} = +10V$. Compute voltage gain, input resistance and output resistance. | 12 | 3 | 1 | 3 |
| (OR) | | | | |
| b. Draw the small signal model of cascode amplifier and derive the expression for voltage gain, input resistance and output resistance. | 12 | 3 | 1 | 2 |
| 29. a. Analyze the source follower amplifier for voltage gain, input impedance and output impedance. | 12 | 3 | 2 | 2 |
| (OR) | | | | |
| b. Determine the voltage gain of the common gate amplifier circuit with the parameters $I_Q = 1mA$, $V^+ = +5V$, $V^- = -5V$, $R_G = 100k\Omega$, $R_D = 4k\Omega$, $R_L = 10k\Omega$, the transistor parameters $V_{TN} = 1V$, $k_n = 1mA/V^2$ and $\lambda = 0$. Assume the input current as $100\sin\omega t \mu A$ and $R_{si} = 50k\Omega$. | 12 | 3 | 2 | 3 |

30. a. Summarize how the shunt-shunt and series-shunt feedback topologies affect the input and output resistance of the closed loop amplifier. 12 2 3 3

(OR)

b.i. Design the RC elements of a wien bridge oscillator for operation at $f_0 = 10kHz$. 6 3 3 2

ii. Construct a Hartley oscillator and derive the frequency of oscillation. 6 2 3 3

31. a. Sketch the transformer coupled class A amplifier and analyze the circuit for output voltage, power and efficiency. 12 3 4 3

(OR)

b.i. For class B amplifier using a supply of $V_{cc} = 30V$ and driving a load of 16Ω , determine the input power, output power and efficiency. 6 3 4 3

ii. Calculate the total harmonic distortion for an output signal having fundamental amplitude of 2.5 V, second harmonic amplitude of 0.25 V, third harmonic amplitude of 0.1 V and fourth harmonic amplitude of 0.05V. 6 3 4 3

32. a. Explain the two transistor current source with neat diagram and derive the expression for output current I_0 and resistance R_0 . 12 3 5 2

(OR)

b. Describe the FET Wilson current source and derive the expression for output current I_0 and resistance R_0 . 12 3 5 2

* * * * *