

1. (a) For a single stage transistor amplifier, $R_s = 10K$ and $R_L = 10K$. The h-parameter values are $h_{rc} = -51$, $h_{ic} = 1.1K\Omega$, $h_{rc} \approx 1$, $h_{oc} = 25 \mu A/V$ Find A_i , A_v , A_{v_s} , R_i , and R_o for the CC transistor configuration.
- (b) For a single stage transistor amplifier, $R_s = 1K\Omega$, and $R_L = 10K$ The h-parameter values are $h_{fe} = 50$, $h_{ie} = 1.1K\Omega$, $h_{re} = 2.5 \times 10^{-4}$, $h_{oe} = 25 \mu A/V$. Find A_i , A_v , A_{v_s} , R_i , and R_o for the CE transistor configuration. [8+8]
2. (a) For the Cascode transistor configuration, which consists of CE stage in series with CB stage, verify that the cascode combination acts like a single CE transistor with negligible internal feedback.
- (b) If two identical cascaded stages have an overall upper 3-dB frequency of 20 KHz and a lower 3-dB frequency [8+8] of 20 Hz. What are f_L and f_H of each stage? Assume non interacting stages?
3. (a) What are the typical values of various components in Hybrid - π model? Show that at low frequencies the Hybrid - π model with r_{be} and r_{ce} taken as infinite reduces to the approximate CE h- parameter model.
- (b) The following low- frequency parameters are known for a given transistor at $I_C = 10mA$, $V_{CE} = 10V$, and at room temperature,
 $h_{ie} = 500 \Omega$
 $h_{oe} = 4 \times 10^{-5} A/V$
 $h_{fe} = 100$
 $h_{re} = 10^{-4}$.
 At the same operating point, $f_T = 50MHz$ and $C_c = 3PF$, compute the values of all the Hybrid - π parameters [8+8]
4. (a) Draw the circuit of class -A transformer fed power amplifier and derive the expression for output power P_o . [10]
- (b) What is cross over distortion? How can a Class-AB power amplifier avoid cross-over distortion? [6]
5. A single tuned direct coupled amplifier feeds a load $R_L = 200k\Omega$. The resonant frequency is 1 MHz, $L = 500\mu H$, $Q = 150$. The transistor has the following parameters $g_m = 5mA/V$ and r_o is very large. Find
- (a) Gain at resonance with load R_L connected and disconnected.
- (b) Bandwidth with and without the load R_L .
- (c) Comment on the results obtained in part (i) and part (ii). [16]
6. Explain in detail the effect of cascading tuned amplifiers and hence derive the expression for bandwidth of n-stage amplifier. Also draw the frequency response and explain what happens as the number of stages increases? [16]
7. (a) Explain why voltage regulators are required for a DC power supply operating from an AC source ?
- (b) A power supply has a voltage regulation of 1% If the no load voltage is 30V What is the full load voltage?
- (c) Give the differences between Load and Line Regulations. [6+4+6]
8. (a) What is catcher diode and explain the necessity of catches diode in Switch Regulator with the help of circuit diagram.
- (b) List the operating ratings and electrical characteristics of IC 723. [8+8]

1. (a) Draw the circuit of an Emitter follower and its equivalent circuit. List out its characteristics.
(b) Design a single stage Emitter follower having $R_i = 500K \Omega$ and $R_o = 20\Omega$. Assume $h_{fe} = 50$, $h_{ie} = 1K$, $h_{oe} = 25\mu A/V$. [8+8]
2. Write short notes on the following:
 - (a) DARLINGTON PAIR circuit
 - (b) CASCODE amplifier
 - (c) DIFFERENCE amplifier [6+5+5]
3. (a) Prove that in Hybrid - π model, the diffusion capacitance is proportional to the emitter bias current.
(b) In Giacolletto model of a transistor at high frequencies, how does C_e vary with $|I_c|$ and $|V_{CE}|$? How does C_c vary with $|I_c|$ and $|V_{CE}|$? [8+8]
4. (a) In series fed Class - A power amplifier, explain the importance of the position of operating point on output signal swing. Show that the conversion efficiency is 25%.
(b) Discuss the origin of various distortions in transistor amplifier circuits. [10+6]
5. (a) Draw the circuit of a Single tuned Inductively coupled amplifier?
(b) Derive the expressions for
 - i. Effective Q-factor (Q_e)
 - ii. Voltage gain (A)
 - iii. Voltage gain at resonance (A_{res}). [6+10]
6. Explain in detail the effect of cascading tuned amplifiers and hence derive the expression for bandwidth of n-stage amplifier. Also draw the frequency response and explain what happens as the number of stages increases? [16]
7. (a) With the help of a neat circuit diagram, explain the operation of BJT shunt voltage regulator.
(b) What is a voltage reference? Why is it needed?
(c) What is the function of a series pass transistor? [8+4+4]
8. (a) Explain different types of protections required in IC Voltage Regulators.
(b) Draw the block diagram of SMPS and explain its working with the help of waveforms. [8+8]

1. (a) Draw the circuit diagram of CB- amplifier and its h-parameter equivalent circuit. List out the characteristics of a CB amplifier.

(b) In a single stage CB amplifier circuit, $R_E = 20K$, $R_C = 10K$, $V_{EE} = -20V$, $V_{CC} = 20V$, $R_L = 10K$ and $R_S = 0.5K$. Find A_i , R_i , R_o , A_v . (8+8)
2. (a) How multistage amplifiers are classified depending upon the type of coupling.
(b) Write a note on distortions in amplifiers.
(c) In an R-C coupled amplifier, $A_{vM} = 60$, $f_L = 50Hz$ and $f_H = 100KHz$. Find the values of frequencies at which the gain reduces to 50 on either side of mid band region. [4+6+6]
3. (a) Draw Hybrid - π model for a transistor in the CE configuration and explain the significance of every component in this model.
(b) Given a germanium p-n-p transistor whose basewidth is 10^{-4} cm. At room temperature and for a dc emitter current of 2 mA, find
 - i. emitter diffusion capacitance,
 - ii. f_T [Assume Diffusion constant as $47 \text{ cm}^2/\text{sec}$]. [8+8]
4. (a) What are the advantages and disadvantages of push pull configuration? Show that in Class-B push pull amplifier the maximum conversion efficiency is 78.5% [8]

(b) A transistor in a transformer coupled (Class - A) power amplifier has to deliver a maximum of 5 Watts to a load of 4Ω load. The quiescent point is adjusted for symmetrical swing, and the collector supply voltage is $V_{CC} = 20$ Volts. Assume $V_{min} = 0$ volts.
 - i. What is the transformer turns ratio?
 - ii. What is the peak collector current? [8]
5. (a) Explain in detail the three undesirable effects produced by the feedback network in a single tuned BJT amplifier with the help of circuit diagram and its Equivalent circuit?
(b) Explain what is Mismatching and why is it used in single tuned amplifiers? [8+8]
6. Explain in detail the effect of cascading tuned amplifiers and hence derive the expression for bandwidth of n-stage amplifier. Also draw the frequency response and explain what happens as the number of stages increases? [16]
7. (a) What is meant by minimum load resistance in voltage regulators? Explain the different factors which decide its value.
(b) Draw and explain the working of a transistor series voltage regulator. [8+8]
8. (a) Draw and explain the typical operating circuit of DC/DC converter and List its Applications.
(b) Design a 723 regulator circuit that will maintain an output voltage of +5V and that will provide current limiting at 0.1 A. Assume that $V_{ref} = 7$ Choose R_2 is 1K ohms. [8+8]

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2. A two stage FET RC coupled amplifier has the following parameters: $g_m = 10mA/V$, $r_d = 5.5K$ and $R_g = 0.5 M$ for each stage. Assume C_s is arbitrarily large.
 - (a) What must be the value of C_b in order that the frequency characteristic of each stage be flat within 1 dB down to 10 Hz ?
 - (b) Repeat the above part if the overall gain of both stages is to be down 1 dB at 10 Hz.
 - (c) What is the overall mid band voltage gain ? [8+4+4]
3. (a) Prove that in Hybrid - π model, the diffusion capacitance is proportional to the emitter bias current.
- (b) In Giacolletto model of a transistor at high frequencies, how does C_e vary with $|I_c|$ and $|V_{CE}|$? How does C_c vary with $|I_c|$ and $|V_{CE}|$? [8+8]
4. (a) Draw push-pull amplifier Class-B amplifier circuit. What are the advantages and disadvantages of Push-pull amplifier? [8]
- (b) Draw and discuss the operation of Class - C power amplifier. [8]
5. (a) What is meant by the term Tuned amplifier and briefly explain the various methods of classification of tuned amplifiers?
- (b) A constant generator drives a parallel tuned circuit consisting of a loss less capacitor 'C' and a coil 'L' (having small resistance 'R'). Derive the expression for the frequency of resonance? [8+8]
6. Explain in detail the effect of cascading tuned amplifiers and hence derive the expression for bandwidth of n-stage amplifier. Also draw the frequency response and explain what happens as the number of stages increases? [16]
7. (a) Explain the terms
 - i. Load Regulation
 - ii. Line Regulation
 - iii. Stability factor
 - iv. Current limiting resistance
- (b) Draw the functional block diagram of Series Voltage Regulator and explain each block. [8+8]
8. (a) How is current boosting achieved in IC723? [6]
- (b) Discuss the limitations of linear voltage regulators. [6]
- (c) Show the standard representation of IC voltage regulator. [4]