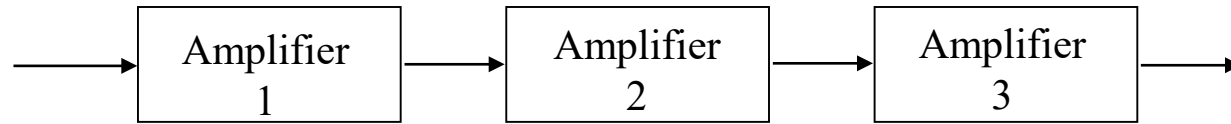


Chapter 3 Noise

5. Three amplifiers are to be connected in cascade to amplify a low level signal. They have the following characteristics:

<u>Amplifier</u>	<u>Power Gain</u>	<u>Noise Factor</u>
A	100	11
B	20	9
C	2	6

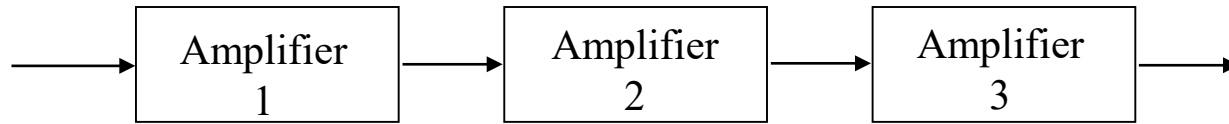
Determine the order in which these amplifiers should be connected to give the best noise performance.



Guided Solution

Method 1 – Reasoning

1. Consider putting Amplifier A, or B, or C as the first stage, respectively (three scenarios, AXX, BXX and CXX).
2. Determine the range of the overall Noise Factor for the three scenarios (no need to calculate the exact value) as
$$F_{AXX} > ?$$
$$F_{BXX} > ?$$
$$F_{CXX} > ?$$
3. List the three Noise Factor (F_{AXX} , F_{BXX} and F_{CXX}) in descending order.
4. Start from the scenario at the bottom of the list (e.g. F_{CXX}).
5. Calculate the overall Noise Factor for that scenario (e.g. F_{CAB} and F_{CBA}).
6. Decide if the lowest overall Noise Factor is found (e.g. if F_{CAB} or F_{CBA} is the lowest value).
7. If yes, choose the combination which gives the lowest overall Noise Factor.
8. If not, consider the next scenario in the order list.
9. Repeat steps 5-8 until the combination with the lowest overall factor is found.



Guided Solution

Method 2 – Using Friis' formula

to calculation to find the noise factor of each connection.

1. Consider all possible combinations of connection (8 combinations, ABC, ACB, ...).
2. Calculate the overall noise factor for each combination Using Friis' formula.
3. Chose the combination which gives the lowest overall noise factor.