



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

**Accredited by NBA-AICTE and Accredited by NAAC – UGC with A+ Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai**

DEPARTMENT OF BIOMEDICAL ENGINEERING

COURSE NAME: 19BMT301 Biocontrol Systems

III YEAR / V SEMESTER

Unit 1– Introduction To Physiological Modelling

Topic 1: Block Diagram Reduction





What We'll Discuss

TOPIC OUTLINE



Block Diagram Algebra
Block Diagram Reduction Techniques



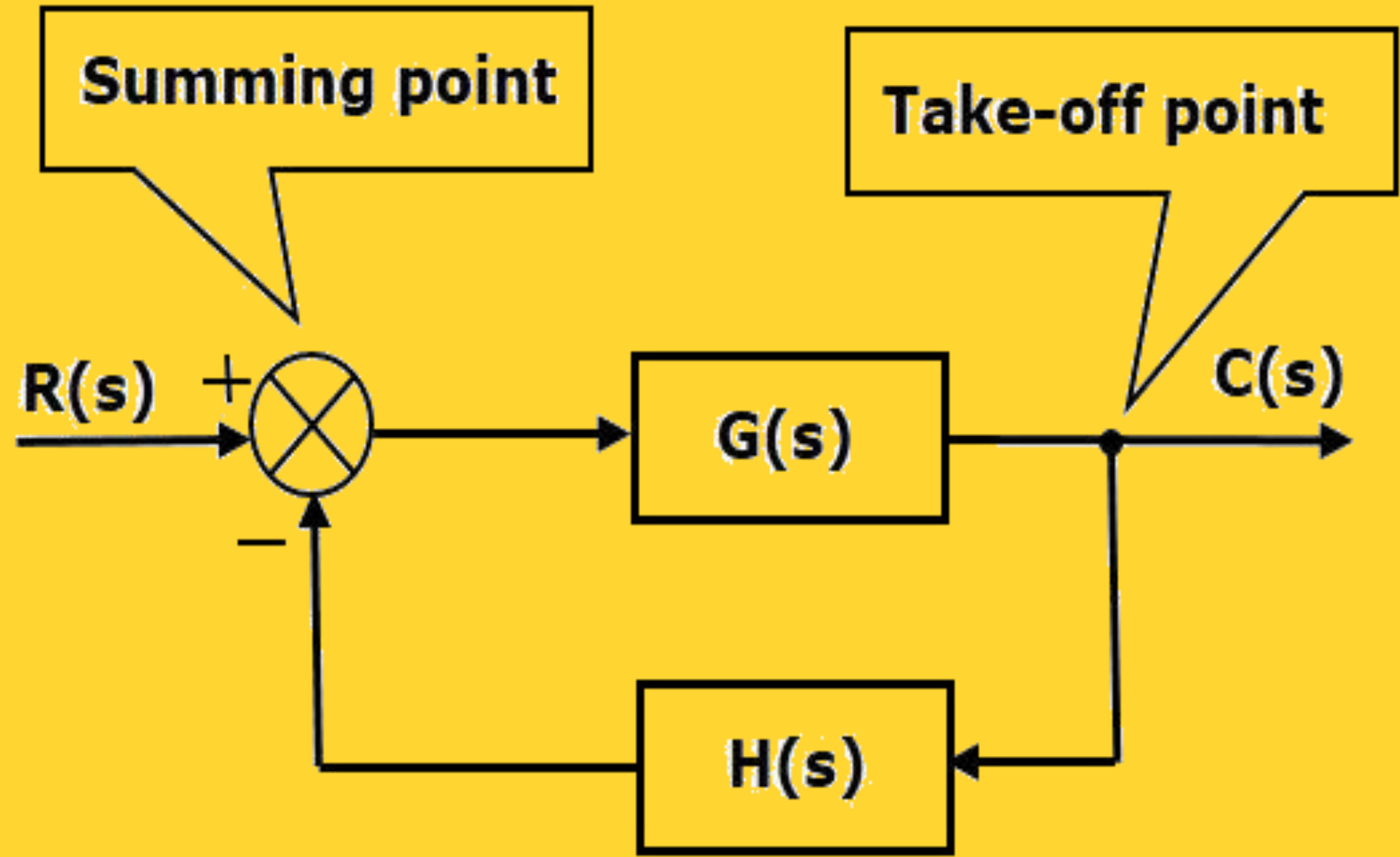
Introduction



- Block diagrams consist of a single block or a combination of blocks.
- These are used to represent the control systems in pictorial form.
- Signal into the block represents the input $R(s)$ and signal out of block represents output $C(s)$, while the block itself stands for the transfer function $G(s)$.
- Flow of information is unidirectional, output being equal to input multiplied by the transfer function of the block.



Basic Elements of Block Diagram





Basic Elements of Block Diagram

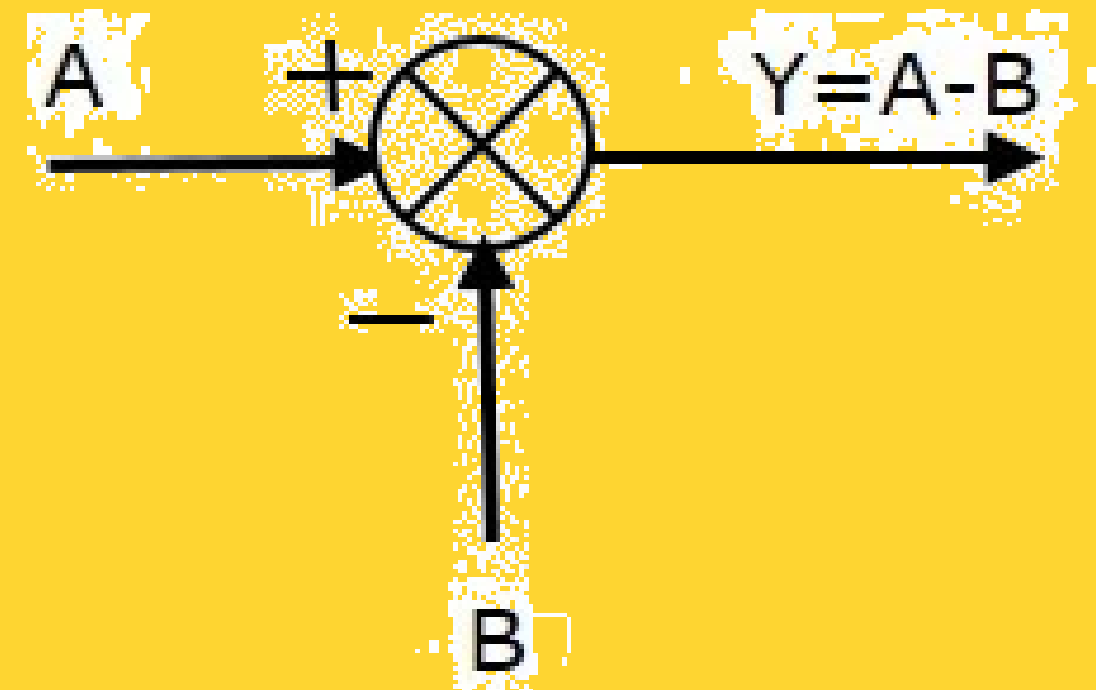
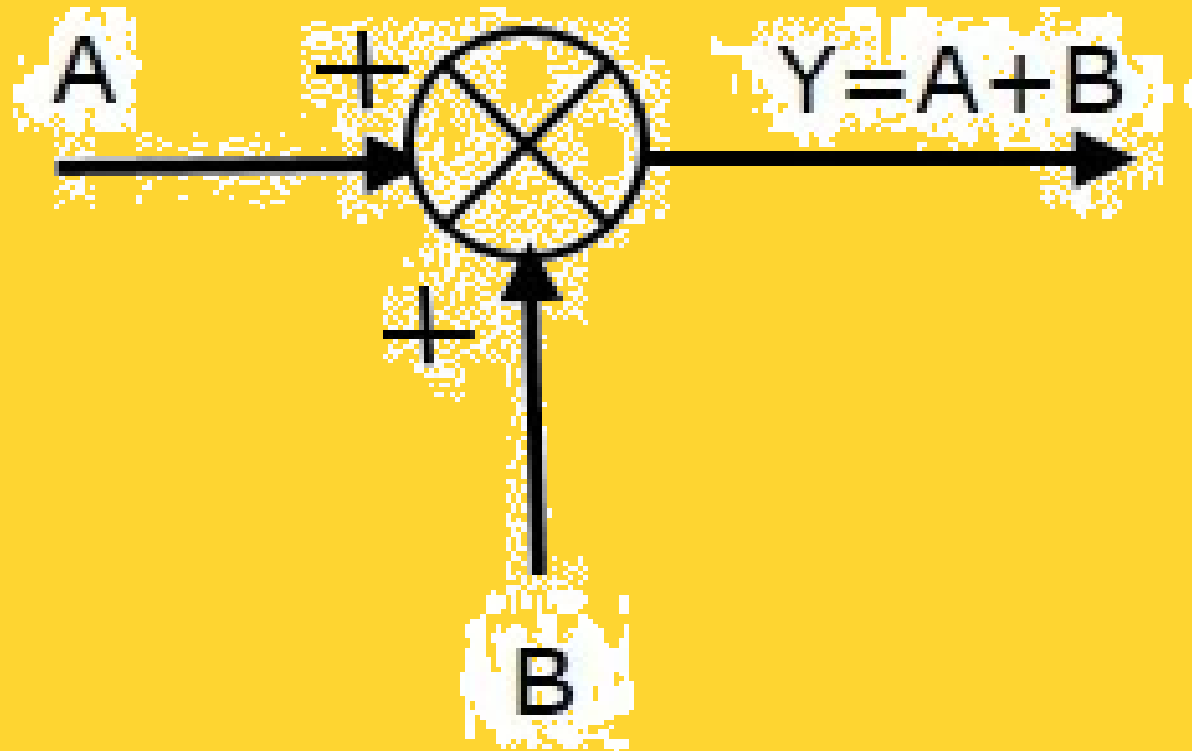


- **Block:**



$$Y(s) = G(s) * X(s)$$

- **Summing Point:**





Rules for BDR



- **Reduce the series blocks**
- Reduce the parallel blocks.
- Reduce minor feedback loops.
- As far as possible shift summing point to the left and take-off point to the right.
- Repeat the above steps till canonical form is obtained.





Rules for BDR



	Manipulation	Original Block Diagram	Equivalent Block Diagram	Equation
1	Combining Blocks in Cascade			$Y = (G_1 G_2) X$
2	Combining Blocks in Parallel; or Eliminating a Forward Loop			$Y = (G_1 \pm G_2) X$
3	Moving a pickoff point behind a block			$y = G u$ $u = \frac{1}{G} y$
4	Moving a pickoff point ahead of a block			$y = G u$
5	Moving a summing point behind a block			$e_2 = G(u_1 - u_2)$
6	Moving a summing point ahead of a block			$y = G u_1 - u_2$ $y = (G_1 - G_2) u$



RECALL TIME

ASSESSMENT
TIME



THANK YOU