



A collage of various analytical chemistry and data visualization elements. It includes a lightbulb with a brain-like filament, a 3D pie chart, a flowchart with arrows, laboratory glassware like test tubes and flasks, and a smartphone displaying data. The background features a dark area with floating black circles and diamonds.

# EPEA516 ANALYTICAL SKILLS II

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# Learning Outcomes



After this lecture, you will be able to

- develop understanding about the basics of substitution and matrix coding,
- analyze different types of substitution and matrix coding,
- solve various problems relating to substitution and matrix coding.

# Substitution

- Some Particular Words
- Certain Substituted Names

# Substitution

- If 'white' is called 'blue', 'blue' is called 'red', 'red' is called 'yellow', 'yellow' is called 'green', 'green' is called 'black', 'black' is called 'violet' and 'violet' is called 'orange', then what would be the colour of human blood?

- White → Blue → Red → Yellow → Green  
Black ← Violet → Orange
- Colour of human blood – Red

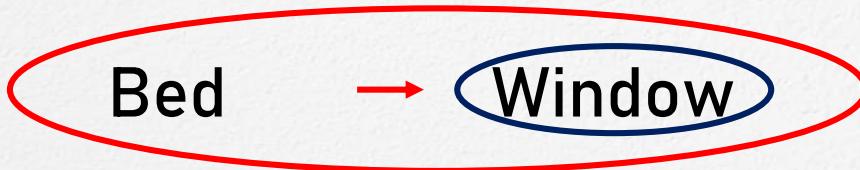
# Substitution

- If 'Parrot' is known as 'Peacock', 'Peacock' is known as 'Swallow', 'Swallow' is known as 'Pigeon' and 'Pigeon' is known as 'Sparrow', then what would be the name of Indian National Bird?

- Parrot → Peacock → Swallow → Pigeon → Sparrow
- Indian National Bird - Peacock

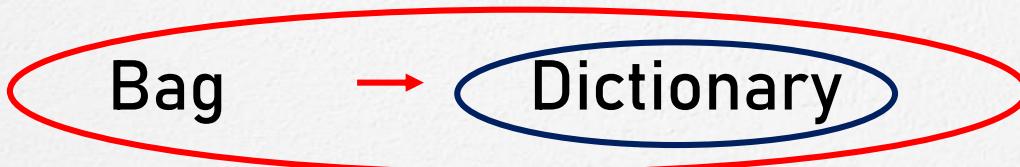
# Substitution

- If room is called bed, bed is called window, window is called flower and flower is called cooler, then on what would a man sleep?
- Room → Bed → Window → Flower → Cooler



# Substitution

- If book is called watch, watch is called bag, bag is called dictionary and dictionary is called window, then which is used to carry the books?
- Book → Watch → Bag → Dictionary → Window



# Substitution

- If the animals which can walk are called swimmers, animals who crawl are called flying, those living in water are called snakes and those which fly in the sky are called hunters, then what will a lizard be called?
- Animals which can walk are called swimmers.
- Animals who crawl are called flying.
- Animals living in water are called snakes.
- Animals fly in the sky are called hunters.

# Matrix Coding

- A word is represented by only one set of numbers.
- Sets of numbers are represented by two classes of alphabets in the two given matrices.
- The columns and rows of both the matrices are numbered.
- A letter from these matrices can be represented first by its row and next by column number.
- To identify the correct set of numbers for the given word.

# Matrix Coding

Matrix - I

	0	1	2	3	4
0	D	K	A	E	C
1	C	D	K	A	E
2	K	C	E	A	D
3	K	C	D	E	A
4	E	D	A	K	C

Matrix - II

	5	6	7	8	9
5	P	L	O	T	N
6	T	P	N	L	O
7	P	N	T	O	L
8	O	N	T	P	L
9	L	O	P	N	T

- Identify the correct code for COLD from the following given options: (First read row and then column)
  - A. 44, 96, 95, 22
  - B. 31, 99, 77, 22
  - C. 30, 66, 86, 43
  - D. 10, 85, 79, 24

# Matrix Coding

**Matrix - I**

	0	1	2	3	4
0	D	K	A	E	C
1	C	D	K	A	E
2	K	C	E	A	D
3	K	C	D	E	A
4	E	D	A	K	C

C	O	L	D
10	85	95	00
21	96	56	11
31	57	68	41
04	78	79	32
44	69	89	24

**Matrix - II**

	5	6	7	8	9
5	P	L	O	T	N
6	T	P	N	L	O
7	P	N	T	O	L
8	O	N	T	P	L
9	L	O	P	N	T

- A. 44, 96, 95, 22
- B. 31, 99, 77, 22
- C. 30, 66, 86, 43
- D. 10, 85, 79, 24

# Matrix Coding

## Matrix

	0	1	2	3	4	5	6	7	8	9
0	I	L	B	P	K	N	H	S	A	E
1	M	A	Q	G	T	V	I	O	N	U
2	H	R	W	J	A	X	B	E	C	I
3	T	Y	A	I	U	U	O	N	J	F
4	F	O	B	M	E	G	U	K	W	R
5	A	C	L	J	X	R	A	A	X	T
6	P	S	U	E	Z	K	V	W	D	L
7	Z	D	Y	V	F	O	H	Y	I	O
8	M	I	Z	Q	E	A	U	E	I	S
9	P	E	O	D	E	U	Q	O	C	G

Identify the correct code for JOKE from the following given options:  
(First read column and then row)

- A. 32, 14, 56, 44
- B. 35, 14, 37, 78
- C. 83, 63, 40, 59
- D. 83, 71, 25, 36

# Matrix Coding

Matrix

	0	1	2	3	4	5	6	7	8	9
0	I	L	B	P	K	N	H	S	A	E
1	M	A	Q	G	T	V	I	O	N	U
2	H	R	W	J	A	X	B	E	C	I
3	T	Y	A	I	U	U	O	N	J	F
4	F	O	B	M	E	G	U	K	W	R
5	A	C	L	J	X	R	A	A	X	T
6	P	S	U	E	Z	K	V	W	D	L
7	Z	D	Y	V	F	O	H	Y	I	O
8	M	I	Z	Q	E	A	U	E	I	S
9	P	E	O	D	E	U	Q	O	C	G

J	0	K	E
32	14	40	19
35	29	56	36
83	57	74	44
	63		48
	71		49
	79		72
	97		78
			90

- A. 32, 14, 56, 44
- B. 35, 14, 37, 78
- C. 83, 63, 40, 59
- D. 83, 71, 25, 36

# Conclusion

- Substitution
  - Particular Words - Substituted Names
- Matrix Coding
  - Table - Code

# Summary

- Coding – Decoding
  - Substitution
  - Matrix Coding

That's all for now...