



Test # 5 - Section XBG

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Design a submarine.

For the design problem statement given above, you are required to-

1. *Generate a design space using the morph chart concept. (3 points)*
2. *From your design space generated above, identify four potential design alternatives, by shading the appropriate cells or by writing them in separate lines. (1 point)*
3. *Select your preferred design using the numerical evaluation matrix method. (2 points)*



Answer

	Function / Feature	Mean				
		1	2	3	4	5
1- Design space "Morph Chart"	Providing Ventilation	Oxygen tanks @ @ @	Ventilation slots @	Ventilation channels connected to the surface		
	Diving into the water	Tanks filled with water @ @	heavy body by gold @	heavy body by metal @	heavy body by silver @	
	declaring about its place	Whistling sound @ @	Light signals @	Sound of a bell @		
	Allows monitoring what is going on outside	Speculum @ @	Glass windows resists water pressure @ @			
	Moving on and under the water.	Water engines @ @	Paddle @ @			

2- Identify four potential design alternatives

- 1- Oxygen tanks, heavy body by gold, Whistling sound, Speculum, Paddle
- 2- Ventilation slots, heavy body by silver, Light signals, Glass windows resists water pressure, Water engines
- 3- Oxygen tanks, heavy body by metal, Whistling sound, Speculum, Water engines.
- 4- Oxygen tanks, Tanks filled with water, Sound of a bell, Glass windows resists water pressure, Paddle

3- Numerical Evaluation Matrix	Design Constraints and Objectives	Design Alternatives			
		1	2	3	4
	C1:the cost less than 300,000	x	x		
	C2:Prevent the entry of water				
	C3: Diving				
	O1:Easy to drive			50	30
	O2:Monitor far places			60	20
	O3: Diving to very deep distance			40	60
	Total			150	110

The best alternatives is number 3

Congratulations.