

# 1. FUNCTIONS

$(2 \times 2) + (1 \times 7) = 11$  Marks

## IMP FORMULAS, KEY CONCEPTS

- 1) A relation  $f : A \rightarrow B$  is said to be a **function**, if **each** element of  $A$  is associated with a **unique** element of  $B$ .
- 2) **Equality of functions:** Two functions  $f, g$  are said to be equal, written as  $f=g$ , if
  - (i)  $f, g$  have the same domain, say  $A$
  - (ii)  $\forall a \in A, f(a) = g(a)$  (i.e., the functional values are equal)
- 3) If  $f : A \rightarrow B, g : B \rightarrow C$  are two functions then their composition is  $gof : A \rightarrow C$  such that  $(gof)(a) = g(f(a)), \forall a \in A$ .
- 4) A function  $f:A \rightarrow B$  is said to be a **oneone** function if,  **$a_1, a_2 \in A$  be such that  $f(a_1) = f(a_2) \Rightarrow a_1 = a_2$**
- 5) A function  $f:A \rightarrow B$  is said to be an **onto** function if  **$\forall b \in B \exists a \in A$  such that  $f(a) = b$** .
- 6) A function, which is both oneone and onto, is said to be a bijective function.
- 7) The identity function on  $A$  is defined as  $I_A(a)=a, \forall a \in A$ .
- 8) A function  $f(x)$  is said to be an (i) **even** function if  **$f(-x) = f(x)$**  (ii) **odd** function if  **$f(-x) = -f(x)$**
- 9) **Hints to find the domains of real functions:**
  - 9.1) If the function is of the form  $\sqrt{f(x)}$  then its domain is  $\{x / f(x) \geq 0\}$   
 If the function is of the form  $\frac{1}{\sqrt{f(x)}}$  (or)  $\log f(x)$  then its domain is  $\{x / f(x) > 0\}$   
 If the function is of the form  $\frac{1}{f(x)}$  then its domain is  $\mathbb{R} - \{x / f(x) = 0\}$
  - 9.2)  $x^2 - a^2 < 0 \Leftrightarrow x \in (-a, a)$  ;  $x^2 - a^2 \leq 0 \Leftrightarrow x \in [-a, a]$   
 $x^2 - a^2 > 0 \Leftrightarrow x \in (-\infty, -a) \cup (a, \infty)$  ;  $x^2 - a^2 \geq 0 \Leftrightarrow x \in (-\infty, -a] \cup [a, \infty)$
  - 9.3) If  $a < b$  then,  $(x - a)(x - b) < 0 \Rightarrow x \in (a, b)$ ;  $(x - a)(x - b) \leq 0 \Rightarrow x \in [a, b]$   
 $(x - a)(x - b) > 0 \Rightarrow x \in (-\infty, a) \cup (b, \infty)$ ;  $(x - a)(x - b) \geq 0 \Rightarrow x \in (-\infty, a] \cup [b, \infty)$
  - 9.4)  $|x| - x \geq 0 \Rightarrow x \in \mathbb{R}$  ;  $|x| - x > 0 \Rightarrow x \in (-\infty, 0)$
  - 9.5)  $x - [x] \geq 0 \Rightarrow x \in \mathbb{R}$  ;  $x - [x] > 0 \Rightarrow x \in \mathbb{R} - \mathbb{Z}$   
 $[x] - x \geq 0 \Rightarrow x \in \mathbb{Z}$  ;  $[x] - x > 0$  is not possible for any real  $x$ .

**BULLET MASTER'S  
MATH BEATS!**

**DOMAIN AND RANGE**

Our **Input** is our **Domain** and our **Output** is our **Range**.

మన **Domain** అంటే మన ప్రతిభ, పట్టుదల, చేసేపనిలో కృషి, సామర్థ్యం, శక్తి..... లాంటి **Inputs**.

ఇటువంటి **Inputs** వలన మనకు వచ్చే విజయాలు, సంతోషం, ఆదాయం, గుర్తింపే మన **Range**.

- 1)  $\sqrt{f(x)}$  అంటే మనం పైన గూట్లో (రూట్లో) safe గా ఉన్నప్పుడు '-Ve ఆలోచనలు చేయరాదు'  $\Rightarrow f(x) \geq 0$
- 2)  $\frac{1}{\sqrt{f(x)}}$  అంటే మనం క్రింది పోర్షన్లో గూట్లో ఉన్నప్పుడు 'పై కొచ్చే +Ve ఆలోచనలే చేయాలి'  $\Rightarrow f(x) > 0$
- 3)  $\frac{1}{f(x)}$  అంటే మనం Helmet లేకుండా క్రిందపడి ఉన్నప్పుడు.....

మనల్ని 0(zero) చేసే ఆలోచనలను మన **BRAIN(R)** నుండి తీసేయాలి  $\Rightarrow R - \{x/f(x) = 0\}$

**BULLET MASTER'S  
MATH BEATS!**

Functions is the **First Chapter** in Maths-1A.

You have to **learn** it in the **Best** way!

Functions carry **11 (2+2+7) Marks** in IPE

It's **IMP.** in IPE and IIT-JEE as well.

**First Q** you see in IPE is from Functions.

**First LAQ** you write in IPE is from Functions.

You get **First VSAQ** from **Functions-1** and **Second VSAQ** from **Domains and Ranges**.

You may have Theorems on Functions as LAQ in IPE.

So, be **friendly with Functions**, they **help you in IPE**.

Celebrate **Math Functions** as good as your **Birthday Function**.

**RELATIONARY FUNCTIONS**

**fog:** father of girl = ఆడపిల్ల తండ్రి; fog = friend of girl; fog = force of gravity.

**gof:** granny of father = జేజమ్మ (తాతమ్మ); gof = god of faith = నమ్మిన దేవుడు.

**fof:** father of father = తాతయ్య ; fof = force of friction

**hogof:** house of granny of father = జేజమ్మ ఇల్లు.

**fogoh:** father of girl of husband = భర్త ఉన్న యువతి తండ్రి = మామగారు