

LD-129

April-2014

F.Y. M.B.A. (KS) (Integrated)**Basic Mathematics****Time : 3 Hours]****[Max. Marks : 100**

- Instructions :** (1) Non-programmable scientific calculators are allowed.
 (2) Attempt questions in sequence and answer fresh question on fresh page.
 (3) Graph paper shall be provided on demand.

1. Attempt any **two** : **20**

- (a) Find the domain and range of the function

$$f(x) = \frac{1}{\sqrt{x^2 - 1}}$$

- (b) Define greatest integer function and draw its graph.
 (c) For a new product, a manufacturer sets up an infrastructure which costs him ₹ 1,50,000. The variable cost is estimated at ₹ 125 for each unit of the product. The sale price per unit is fixed at ₹ 160. How many minimum number of units are to be produced in the first year of production so that there may be no loss during that year ?

2. Attempt any **four** : **20**

(i) $\lim_{x \rightarrow 1} \left(\frac{1}{x-1} - \frac{2}{x^2-1} \right)$

(ii) $\lim_{x \rightarrow \infty} \left(1 - \frac{4}{x} \right)^x$

(iii) $\lim_{x \rightarrow 4} \frac{x^3 - 64}{x^2 - 16}$

(iv) $\lim_{x \rightarrow \infty} \sqrt{x+1} - \sqrt{x}$

(v) If $f(y) = \begin{cases} \frac{|y|}{y} & ; y \neq 0 \\ 0 & ; y = 0 \end{cases}$

Discuss the continuity at $y = 0$.

3. (a) Attempt any **two** : **10**
- (i) Differentiate w.r.t. x , the function

$$\frac{(x+1)(2x-1)}{(x-3)}$$
- (ii) Differentiate w.r.t. x ,

$$y = \log(x \cos x)$$
- (iii) Let $y = e^{\tan x}$

$$z = \sin x$$

 find $\frac{dy}{dz}$
- (b) A monopolist's demand function is $p = 300 - 5x$. Find
- (i) the marginal revenue function
- (ii) at what price is the marginal revenue zero. **10**
4. (a) Show that the maximum value of $x + \frac{1}{x}$ is less than its minimum value. **10**
- (b) Suppose a manufacturer can sell x items per week at a price $P = 20 - 0.001x$ rupees each when it costs $y = 5x + 2000$ rupees to produce x items. Determine the number of items he should produce per week for maximum profit. **10**
5. (a) Prove that **10**
- $$\begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix} = 2(a+b+c)^2$$
- (b) A manufacturer produces two types of products X and Y. Each product is first processed in a Machine M_1 and then sent to another machine M_2 for finishing. Each unit of X requires 20 minutes time on M_1 and 10 minutes time on M_2 whereas each unit of Y requires 10 minutes time on M_1 and 20 minutes time on M_2 . The total time available on each machine is 600 minutes. Calculate the number of units of two types of products produced by matrix algebra. **10**
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