



A-2935

First Year B. Sc. (Sem. I) Examination
February / March – 2015
CCM-102 CS : Mathematics for Comp. Sc. - II
(Calculus - I)

Time : Hours]

[Total Marks : 70

Instructions :

(1)

નીચે દર્શાવેલ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી. Fillup strictly the details of signs on your answer book.		Seat No. :				
Name of the Examination :		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Name of the Subject :		<div style="border: 1px solid black; border-radius: 15px; padding: 10px; text-align: center;">Student's Signature</div>				
F.Y. B.Sc. (SEM. 1)						
CCM-102 CS : MATHEMATICS FOR COMP. SC. - 2						
Subject Code No. : <input type="text" value="2"/> <input type="text" value="9"/> <input type="text" value="3"/> <input type="text" value="5"/>		Section No. (1, 2,.....) :		<input type="text" value="Nil"/>		

- (2) All questions are compulsory.
(3) Figures to the right indicate full marks.

1 Answer the following questions : 10

(1) If $f(x) = (1+3x)^{\frac{1}{x}}$; $x \neq 0$ is continuous at $x=0$ then
 $f(0) = \underline{\hspace{2cm}}$.

(2) If $y = \sin x + \cos x$ then find y_{4n} .

(3) Explain ONE ONE AND ONTO functions with illustration.

(4) Evaluate $\int_0^1 \frac{2x}{x^2+1} dx$.

(5) The integral of $\cos x$ is $\sin x$ then the integral of
 $\cos(ax+b) = \underline{\hspace{2cm}}$.

- 2 (a) If $f(x) = \frac{1}{2x+1}x \neq -\frac{1}{2}$ then prove that 5

$$f(f(x)) = \frac{2x+1}{2x+3}, x \neq -\frac{3}{2}.$$

OR

- (a) Show that $f(x) = 3x^2 + 2x - 1$ is continuous at 2. 5
- (b) Attempt any two : 10

- (1) Define Domain and Range of the function and find

the same for $f(x) = \frac{x^2 - 9}{x - 3}$.

- (2) If $f(x) = \sqrt{x}$ and $g(x) = \frac{1}{x^2}$ then find the domains

of the $f \circ g$ and f/g .

- (3) If $f(x) = 5x - 2$; $x \in N$ If range of the function is $\{3, 8, 13\}$ then find the Domain.

- (4) If f is a real function defined by $f(x) = \frac{x-1}{x+1}$ then

prove that $f(2x) = \frac{3f(x)+1}{f(x)+3}$.

- 3 (a) Obtain $\lim_{\theta \rightarrow +\infty} 7\theta^3 + 8\theta^2 + 5\theta - 7$. 5

OR

- (a) Show that $f(x) = \sin x$ is continuous for every value 5
of x .

(b) Attempt any **two** : 10

(1) Examine the continuity of the function defined by

$$f(x) = \begin{cases} -x^2, & x \leq 0 \\ 5x - 4, & 0 < x < 1 \\ 4x^2 - 3x, & 1 < x < 2 \\ 3x + 4, & x \geq 2 \end{cases}$$

at the points 0, 1, 2.

(2) Obtain $\lim_{x \rightarrow 4} \frac{x^2 - 16}{\sqrt{x^2 + 9} - 5}$

(3) Obtain $\lim_{x \rightarrow 3} \left(\frac{\sqrt{x+3} - \sqrt{6}}{x^2 - 9} \right)$

(4) Investigate the points of continuity and discontinuity of the function f defined by

$$f(x) = \begin{cases} \frac{x^2}{a} - a, & x \leq a \\ a - \frac{a^2}{x}, & x > a \end{cases}$$

4 (a) Find the n^{th} derivative of $\sin(ax+b)$. 5

OR

(a) If $y = \log(ax+b)$; $a, b, x \in R$ then find y_n . 5

(b) Attempt any **two** : 10

(1) Obtain n^{th} derivative of $\frac{x^2}{(x+2)(2x+3)}$

(2) Obtain the n^{th} derivative of $(ax+b)^m$.

(3) Obtain derivative of $y = \frac{x-1}{(x-2)(x-3)}$

(4) Obtain n^{th} derivative of $\log \left(x + \sqrt{1+x^2} \right)$ at $y=0$.

5 (a) Evaluate : $\int \log(x+1)dx$. 5

OR

(a) Evaluate : $\int \frac{dx}{x^2(x^4+1)^{3/4}}$ 5

(b) Attempt any **two** : 10

(1) Evaluate $\int \frac{dx}{\cos(x+a)\cos(x+b)}$

(2) Find the area of the region bounded by the parabola $y^2 = 4x$ and the line $y = 4x$.

(3) Evaluate $\int \frac{dx}{\sin x(a+b \cos x)}$

(4) Evaluate $\int \frac{xdx}{x^4 - x^2 + 1}$.
