02812

# BACHELOR IN COMPUTER APPLICATIONS

## Term-End Examination

## June, 2010

## CS-601 : DIFFERENTIAL AND INTEGRAL CALCULUS WITH APPLICATIONS

*Time : 2 hours* *Maximum Marks : 60*

***Note :*** *Question number **1** is **compulsory**. Answer **any three** from rest.*

**1.** (a) Find $\frac{d}{dx}\left(2x^3 + 7\right)$. **2**

(b) Find $\frac{d}{dx}\left(4\cos x + 12\right)$. **2**

(c) State ***any FIVE*** (basic) properties of real members w.r.t. '+' (plus) and '.' (multiplication). **5**

(d) Find the value of $\int(2\sin x + 15)\,dx$. **2**

(e) Evaluate $\int\left(2 + 4x + 9x^2\right)dx$. **3**

(f) Tell, whether the following function $f(x)$ is monotonically increasing, monotonically decreasing or neither : $f(x) = 3x^2 + 2$ on the interval [1, 3]. **4**

(g) Find the area bounded by the curve $y = 2x^2 - 32$, the $x$-axis and the ordinates $x = 3$ and $x = -3$. 6

2. (a) If $|x|$ denotes modulus of $x$, then show that 6

(i) $|2x| = |-(2x)|$

(ii) $|3x + 2y| \leq 3|x| + 2|y|$.

(the symbol '$\leq$' denotes 'less than or equal to')

(b) Evaluate each of the following : 6

(i) $\frac{d}{dx}(3 \sec x + 14)$

(ii) $\frac{d}{dx}(5 e^x + 12)$

3. (a) Find the maxima and minima for each of the following functions : 6

(i) $f(x) = 5x$ for $0 \leq x \leq 2$

(ii) $f(x) = 14x^2 + 7$ for $0 \leq x \leq 5$

(the symbol '$\leq$' denotes 'less than or equal to').

(b) Let $f(x) = 2x^3$ on $[0, 1]$. 6

Find a point C in ] 0, 1 [ as in the mean value theorem.

4. (a) (i) Evaluate $\int (7x^2 + 5x + 8)\, dx$. 6

(ii) Evaluate $\int_1^3 e^{5x} dx$

(b) Evaluate $\int_0^{\pi/2} 2\ sin^2 x\ cos^4 x\ dx$ 6

5. (a) Use the trapezoidal rule to estimate the following integral with the given value of $n$ : 6

$\int_2^3 3\ x^2\ dx$ with $n = 4$

(b) Find the equations of the tangents at origin to the following curve : 6

$y^2 = x^2\ (1 - x^2)$