DIFFERENTIATION & APPLICATIONS (Q 6 & 7, PAPER 1)

LESSON NO. 10: CUBIC FUNCTIONS

2006

6 (b) The equation of a curve is $y = 3x^4 - 2x^3 - 9x^2 + 8$.

(i) Show that the curve has a local maximum at the point (0, 8).

(ii) Find the coordinates of the two local minimum points on the curve.

(iii) Draw a sketch of the curve.

2004

6 (c) Let $f(x) = x^3 + 6x^2 + 15x + 36,\ x \in \mathbf{R}$.

(i) Show that $f'(x)$ can be written in the form $3[(x+a)^2 + b],\ a, b \in \mathbf{R}$, where $f'(x)$ is the first derivative of $f(x)$.

(ii) Hence show that $f(x) = 0$ has only one real root.

2002

6 (c) The function $f(x) = ax^3 + bx^2 + cx + d$ has a maximum point at (0, 4) and a point of inflection at (1, 0). Find the values of *a*, *b*, *c* and *d*.

2001

7 (c) Let $g(x) = x^2 + \dfrac{a}{x^2}$ where *a* is a real number and $x \in \mathbf{R},\ x \neq 0$. Given that *g*(*x*) has a turning point at *x* = 2,

(i) find the value of *a*

(ii) prove that *g*(*x*) has no local maximum points.

ANSWERS

2006 6 (b) (ii) $(-1, 4),\ (\frac{3}{2}, -\frac{61}{16})$

2004 6 (c) (i) $f'(x) = 3[(x+2)^2 + 1]$ (ii) $f'(x) = 3[(x+2)^2 + 1] > 0$

2002 6 (c) $a = 2,\ b = -6,\ c = 0,\ d = 4;\ f(x) = 2x^3 - 6x^2 + 4$

2001 7 (c) (i) $a = 16$