Ministry Of Higher Education **Higher Institute of Engineering** **6th of October City** **Department of Basic Science**	مدينة الثقافة و العلوم	**Prep. Year: Final Exam** **Mathematics: (Calculus I)** **Course Code, BAS 11** **Date: 28 / 1 / 2010**
الزمن: 3 ساعات	**الامتحان (5) أسئلة في صفحة واحدة و المطلوب الإجابة عن كل الأسئلة**	

Marks

[1]Find y` from the following: (12)

(a) $y = x^4 + x^{\sin x}$ (b) $y = \dfrac{x^2}{x + \sin x}$ (c) $y = 4^x + \log(2x+3)$

(d) $y = \sin^{-1}x + (\tan x)^{-1}$ (e) $y = 3x^5 + 2x + 3$ (f) $y^2 + x\sin(x+y) = 0$

[2](a)Write the membership table of the statement: $S = (A \cap B) \cup (C - B)$ (4)

(b)Evaluate the following limits: (8)

(i) $\lim\limits_{x\to 0} \dfrac{1-\cos x}{x-1+e^x}$ (ii) $\lim\limits_{x\to 0} \dfrac{\sqrt{\sin x}}{\sqrt{x}}$ (iii) $\lim\limits_{x\to\infty} \dfrac{3+2x^3}{x^3+3x+2}$ (iv) $\lim\limits_{x\to 0} \dfrac{e^x-1}{\ln(1+x)}$

[3](a)Find the maximum and minimum values of f(x) = 4 + ln(2x + 3) (2)

(b)Find the inflection points of f(x) = $x^3 - 12x^2 + 1$ (2)

(c)Sketch the curve of each of the following functions: (8)

(i) $f(x) = x^4 - 1$ (ii) $f(x) = x + \dfrac{1}{x}$

[4]Evaluate the following integrals: (12)

(a) $\int \dfrac{2x+1}{x^2-4x+3}\,dx$ (b) $\int \dfrac{2x+2}{x^2+2x+4}\,dx$ (c) $\int_0^{\pi/2} \dfrac{\cos x}{\sqrt{4+5\sin x}}\,dx$

(d) $\int x e^x\,dx$ (e) $\int (x^2 + \dfrac{2}{x+3})\,dx$ (f) $\int (x^2\sqrt{1-x^2})\,dx$

[5](a)Using trapezoidal rule, compute the integral $\int_1^{\infty} \dfrac{\sqrt{\sin(1/x)}}{x^2}dx$, $\Delta = 0.2$ (4)

(b)Find the area of the region between the curve: (4)

$y = x^3$, x- axis, $x \in [-1, 1]$

(c)If the region between the curve $y = \sin x$, x-axis, $x \in [0, \pi/2]$ is rotated about (4)

x-axis. Find the volume of the generated solid.

Good Luck *Dr. Mohamed H. Eid*