Higher Institute of Engineering   Prep. Year: Mid-Term Exam
     6th of October City   1st Term: 2005/2006
                  I   Mathematics (Calculus I)

Sec:		الاسم:

Answer the following questions: Time: 1 Hour

(1) Generate the membership table of the statement:

$$S = (A - B) \cup (B - C`)$$

(2) Evaluate the following limits:

(a) $\lim\limits_{x \to 3} \dfrac{x^3 - 27}{\sqrt{x} - \sqrt{3}}$ (b) $\lim\limits_{x \to \infty} \dfrac{x^2 - 8x + 1}{x^3 + 5x + 3}$ (c) $\lim\limits_{x \to 0} \dfrac{\sin 2x}{x^2}$

(3) Find y` and y`` from the following:

(a) $y = x^3 + e^{3x} + \sin x$ (b) $y = 2^x + \tan^{-1} x$ (c) $y = x . \sinh x$

(4) Find y` from the equation: $x + y + \sin(x + y) = 0$

Sec:		الاسم:

Answer the following questions: Time: 1 Hour

(1) Generate the membership table of the statement:

$$S = (A \cup B`) \cap (B \cup C`)$$

(2) Evaluate the following limits:

(a) $\lim\limits_{x \to 2} \dfrac{x^3 - 8}{x^2 + 4}$ (b) $\lim\limits_{x \to 0} \dfrac{e^{3x} - 1}{2x}$ (c) $\lim\limits_{x \to 0} \dfrac{\log(1 + 3x)}{4x}$

(3) Find y` and y`` from the following:

(a) $y = x^4 + 2^x + \tan x$ (b) $y = 8 + \sin^{-1} x$ (c) $y = x . \ln x$

(4) Find y` from the equation: $2x + y^3 + \cos(xy) = 0$

Higher Institute of Engineering
6th of October City

Prep. Year: Mid-Term Exam
1st Term: 2005/2006

III   Mathematics (Calculus I)

Sec:		الاسم:

Answer the following questions: Time: 1 Hour

(1)Generate the membership table of the statement:

$S = (A \cap C`) \cup (B - A`)$

(2)Evaluate the following limits:

(a) $\underset{x \to 1}{Lim} \dfrac{x^3 - 1}{\sqrt{x} - 1}$ (b) $\underset{x \to \infty}{Lim} \dfrac{x^3 - 8x + 1}{x^4 + 5x + 5}$ (c) $\underset{x \to 0}{Lim} \dfrac{\sin^2 x}{2x}$

(3)Find y` and y`` from the following:

(a) $y = (2x+1)^4 + \ln(2 + 3x)$ (b) $y = \sin^4 x$ (c) $y = x\,e^{2x}$

(4)Find y` from the equation: $x^4 + y + \ln(2x + y) = 0$

Ministry Of Higher Education

Higher Institute of Engineering

6th of October City

Department of Basic Science

Prep. Year: Final Exam

Mathematics: (Calculus I)

Course Code, BAS 111

Date: 16/ 1 / 2006

الامتحان مكون من (5) أسئلة مكتوبة فى صفحة واحدة و المطلوب الإجابة على كل الأسئلة.

و درجات الأسئلة متساوية.   الزمن: 3 ساعات

(1)(a) Write the membership table of the statement: $S = (A - B) \bigcap (A \bigcup C)$

(b) Evaluate the following limits:

(i) $\displaystyle \lim_{x \to 2} \frac{\sqrt{x} - \sqrt{2}}{x^3 - 8}$

(ii) $\displaystyle \lim_{x \to 3} \frac{x^2 - 9}{x^2 + 1}$

(iii) $\displaystyle \lim_{x \to 0} \frac{\sin 2x}{\cos 3x}$

(iv) $\displaystyle \lim_{x \to \infty} \frac{x^3 - 8x + 4}{x^3 + x^2 + 3}$

(v) $\displaystyle \lim_{x \to 0} \frac{\ln(1 + 3x)}{2x}$

(vi) $\displaystyle \lim_{x \to 0} \frac{3^x - 1}{3x}$

(2) Find the first derivative of the following functions:

(a) $f(x) = 2x^4 + \cos 3x$

(b) $f(x) = (x^2 + \tan x)^5$

(c) $f(x) = e^{2x} + 3\sin^{-1} x$

(d) $f(x) = x \ln(1 + \cosh x)$

(e) $f(x) = 3 + \dfrac{\sin x}{x^2 + 3}$

(f) $f(x) = 3^x - \sin^4 x$

(3)(a) Find $y`$ from the equation: $x^2 + y^2 + x \sin y = 0$

(b) Obtain the maximum and minimum points of the functions:

(i) $f(x) = 4 + 4x - x^2$

(ii) $f(x) = x^3 - 3x^2 - 9x$

(c) Determine the inflection points of the function $f(x) = x^3 + 1$

(4)(a) Trace the curve of the function $f(x) = \dfrac{1}{x^2 - 1}$

(b) Evaluate the following integrals:

(i) $\displaystyle \int \frac{x + 1}{x^2 - 5x + 6} \, dx$

(ii) $\displaystyle \int (\cos x)^2 \, dx$

(iii) $\displaystyle \int x e^x \, dx$

(5)(a) Evaluate the following integrals: (i) $\displaystyle \int_1^2 (3x^2 + 2x) dx$

(ii) $\displaystyle \int_0^1 (2 + \frac{1}{x + 3}) dx$

(b) Find the area of the region bounded by the curve $y = 3x^2 + 2$, x-axis, $x \in [0, 2]$

(c) Evaluate the volume of the solid generated by revolving the region bounded by the curve $y = e^x + 1$, x-axis and $x \in [0, 1]$ about x-axis.

Good Luck   Dr. Mohamed H. Eid