Higher Institute of Engineering **Prep. Year: Mid-Term Exam**
6th of October City **Mathematics (Calculus I)**
First Term: 2004/2005 **I** **Examiner: Dr. Mohamed Eid**

Answer the following questions: Time: 1 Hour

(1)Generate the membership table of the statement:

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

(2)Evaluate the following limits:

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

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

(a) $y = x^4 + e^{2x} + \cos 3x$ (b) $y = 5^x \cdot \tan^{-1} x$ (c) $y = \sinh x . \ln x$

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

Higher Institute of Engineering **Prep. Year: Mid-Term Exam**
6th of October City **Mathematics (Calculus I)**
First Term: 2004/2005 **II** **Examiner: Dr. Mohamed Eid**

Answer the following questions: Time: 1 Hour

(1)Generate the membership table of the statement:

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

(2)Evaluate the following limits:

(a) $\lim_{x \to 3} \frac{x^3 - 27}{x^2 - 9}$ (b) $\lim_{x \to \infty} \frac{x^2 - 8x + 4}{x^3 + x + 3}$ (c) $\lim_{x \to 0} \frac{\tan 3x}{x}$

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

(a) $y = x^3 + 3^x + \sin 3x$ (b) $y = 4^x . \tanh^{-1} x$ (c) $y = \cos x . \ln(1 + x)$

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

Ministry Of Higher Education | **Prep. Year: Final Exam**
Higher Institute of Engineering | **Mathematics: (Calculus I)**
6th of October City | **Course Code, BAS 111**
Department of Basic Science | **Date: 10/ 1 / 2005**

الامتحان مكون من (5) أسئلة مكتوبة فى صفحة واحدة و المطلوب الإجابة على كل الأسئلة0
و درجات الأسئلة متساوية0 الزمن: 3 ساعات

(1)(a)Write the membership table of the statement:

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

(b)Evaluate the following limits:

(i) $\lim\limits_{x\to 3} \dfrac{\sqrt{x}-\sqrt{3}}{x^3-27}$ (ii) $\lim\limits_{x\to 2} \dfrac{x^2-4}{x^3+8}$

(iii) $\lim\limits_{x\to 2} \dfrac{\sin(x-2)}{2x-4}$ (iv) $\lim\limits_{x\to \infty} \dfrac{3x^2-8x+4}{x^2+x+3}$

(c)Find the domain of the function: $f(x) = x^2 + \sqrt{4-x^2} + \dfrac{3}{x-1}$

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

(a) $f(x) = x^4 + 8 + \sin 2x$ (b) $f(x) = (x^3+2x)^4 + \tan^3 x$

(c) $f(x) = e^{2x} + \tan^{-1} 2x$ (d) $f(x) = 2^x . \ln(2 + \sinh 2x)$

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

(b)Find $\dfrac{dy}{dx}$ where $y = 3 + \cosh t$ and $x = t + e^{3t}$

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

(i) $f(x) = 2 + 6x - x^2$ (ii) $f(x) = x^3 - 3x^2 - 9x$

(4)Evaluate the following integrals:

(a) $\int \dfrac{x+4}{x^2-3x+2}\,dx$ (b) $\int (\sin x)^2\,dx$ (c) $\int x\,e^{2x}\,dx$ (d) $\int \dfrac{1}{x^2\sqrt{1-x^2}}\,dx$

(5)(a)Evaluate the following integrals:

(i) $\int_0^1 (x^4 + \dfrac{1}{x+2})dx$ (ii) $\int_0^1 x\,(x^2+3)^4\,dx$

(b)Find the area of the region bounded by the curve $y = 2x + e^x$, x-axis and $x \in [0,1]$.

(c)Evaluate the volume of the solid generated by revolving the region bounded by the curve $y = x^2 + 1$, x-axis and $x \in [0,1]$ about x-axis.

Good Luck Dr. Mohamed H. Eid