- Answer **all** questions
- The Exam Consists of One page

- No. of questions: 4
- Total Mark: 100 Marks

Marks

[1] Find **y`** from the following: 24

(a) $y = 3x^4 + 2^{\tan x}$ (b) $y = \cos 2x . \sinh x^3$ (c) $y = \tanh x^3 . \ln(x + 2^x)$

(d) $y = \tan^{-1}x^2 + \sec^{-2}x$ (e) $y = \log \dfrac{\sqrt[3]{x}.sec^4 x}{\sqrt[5]{x+\text{sech } x}}$ (f) $y \cos y + x \sin x = 3$

(g) $y = \dfrac{\sin^8 x.\sin h^4 x}{\sqrt[8]{x+\cos x}.\sqrt[4]{x+\cosh x}}$ (h) $y = t^2 + \ln t, \quad x = t + \log t$

[2](a)Find the following limits:

(i) $\underset{x\to 0}{\text{Lim}} \dfrac{\tan^4 x}{x^5 + \sin^4 x}$ (ii) $\underset{x\to 0}{\text{Lim}} \dfrac{x - \sin x}{3^x - 4^x}$ (iii) $\underset{x\to \infty}{\text{Lim}} \dfrac{3x + x^2}{x^3 + 2}$ 9

(b)Write the Maclurin's series of the function: $f(x) = \ln(1 + 2x)$ 5

(c)Determine the maximum, minimum and inflection points of the functions:

$f(x) = \dfrac{1}{1+x^2}$, $g(x) = 2x - e^{2x}$, $h(x) = x + \cos x$.   12

[3] Find the integrals: 36

(a) $\int (1 + \tan\theta)^2 \, d\theta$ (b) $\int \dfrac{x+3}{\sqrt{5-4x-x^2}} dx$ (c) $\int x^3.\sqrt{1 + x^2} \, dx$

(d) $\int x^4. \ln x \, dx$ (e) $\int \cos^5 x \, dx$ (f) $\int e^x \cosh 3x \, dx$

[4](a)Find the area enclosed by the curve: $r = a(1 + \cos\theta)$.   4

(b)Find the area of the surface of revaluation generated by revolving about x-axis   5

the hypocycloid: $x = a \cos^3 \theta, \ y = a \sin^3 \theta$.

(c)Find the volume generated by revolving the area bounded by $x = a(\theta - \sin\theta)$,   5

$y = 1 - \cos\theta, \ 0 \le \theta \le 2\pi$ about x-axis.

Good Luck   *Dr. Mohamed Eid*   *Dr. Fathi Abdsallam*

Group:	Section:		الإسم:

[1] Find the following limits:

$(a)\ \underset{x\to 0}{\text{Lim}}\ \dfrac{\sin 2x}{2^{3x}-1}$

$(b)\ \underset{x\to 2}{\text{Lim}}\ \dfrac{\ln(x-1)}{x-2}$

$(c)\ \underset{x\to\infty}{\text{Lim}}\ \dfrac{2-3x+x^2}{x^3++2x-3}$

[2] Find $y`$ where

(a) $y = 2x^3 - 2\cos x^2$

(b) $y = \sin^{-1}x^2 + \tan^{-2}x$

(c) $y = 4^{x^3}.\tanh^{-1}x + \log 8$

(d) $y = \log \dfrac{\sqrt[4]{x+\cosh\ x}}{\sqrt[3]{\sinh\ x+\sec\ x}}$

[3] Prove that: $\tanh^{-1}x = \dfrac{1}{2}\ln\dfrac{1+x}{1-x}$