The Exam consists of one page   Answer all questions   No. of questions: 5   Total Mark: 70

Question 1

Find $\mathbf{y}^{\grave{}}$ from the following:

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(a) $y = 2x^3 - 3\cos x$ (b) $y = x^4 . \sin x$ (c) $y = \tan x^2 + tan^2 x$

(d) $y = (x^3 + 2)^{-6}$ (e) $y = \dfrac{3}{4} - \dfrac{5}{x^4}$ (f) $y = \dfrac{x}{3} + \dfrac{2}{\cot x}$

Question 2

Find the limits:

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(a) $\underset{x \to 4}{\text{Lim}} \dfrac{\sqrt{x} - 2}{16 - x^2}$ (b) $\underset{x \to 0}{\text{Lim}} \dfrac{x - \sin x}{x^2 + \tan 2x}$ (c) $\underset{x \to 0}{\text{Lim}} \dfrac{\sin 2x}{x^2 - x}$ (d) $\underset{x \to \infty}{\text{Lim}} \dfrac{x + 2x^5}{1 + x^5}$

Question 3

(a) Find the extrema of each function :(i) $f(x) = x^4 - 2x^2$ (ii) $g(x) = 1 - x^3$ 10

(b) Write the Maclurin's expansion of the function : $f(x) = x . \sin x$.   4

Question 4

(a) State the definition of the hyperbola.   3

(b) Write the equation of circle with center (1, –2) and radius 3.   4

(c) Show that the following circles are orthogonal and find the radical axis :   8

$x^2 + y^2 + 2x + 4y - 2 = 0, \; x^2 + y^2 - 4x + 3y + 4 = 0.$

Question 5

(a) State the definition of the ellipse.   2

(b) Find the angle between the lines: $x^2 - 3xy + 2y^2 = 0$ and separate them.   4

(c) Write the equation of line which passes through the points : (3, 1), (1, –2).   4

(d) Find center, vertices and sketch the parabola: $x^2 - 4x + 4y + 12 = 0.$ 5

Good Luck   *Dr. Mohamed Eid*