Ministry of Higher Education& Scientific Research
University of Technology
Materials Engineering Dep.
Subject: Mathematics – I
Examiner: Dr. Mohammed Ramidh
Allowed time: 3 hours

وزارة التعليم العالي والبحث العلمي
الجامعة التكنولوجية
قسم هندسة المواد

Class 1st grade
Signature :
Date: 07 / 06 / 2015

First Semester (2014-2015)

Note: Answer five questions only

Q1) **a: -** Find equations for the tangent and normal to the curve $y = 1+ \cos x$ at the point $(\pi/2, 1)$. (12 mark).

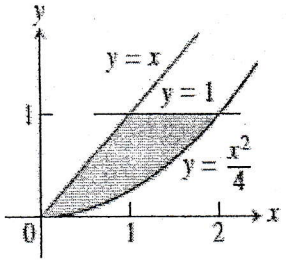
b:- Use l'Hôpital's Rule to evaluate the limit, $\lim_{x\to 0} \frac{1-\cos x}{x^2}$. (8 mark).

Q2) **a:-** Use Newton's method to estimate the one real solution of $x^3 + 3x + 1 = 0$.
Start with $x_0 = 0$ and then find x_2. (10 mark).

b:- Parabola is to be shifted. Find an equation for the new parabola, and find the new vertex, Focus, and directrix. $x^2 = 8y$, right 1, down 7 (10 marks) .

Q3) **a: -** Use the steps of the graphing procedure to graph the equation. $y = 1 - 9x - 6x^2 - x^3$
Include the coordinates of any local extreme points and inflection points. (10 mark).

b:- Find the total areas of the shaded regions as shown. (10 mark).

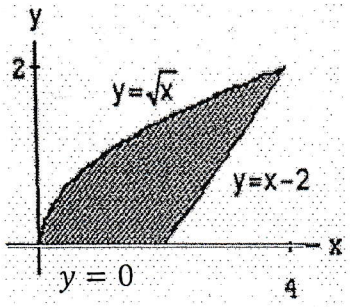


Q4) **a: -** Find $\frac{dy}{dx}$ if $y = x^{3/2}$ by using chain rule with y as a composite of $y = u^3 and\ u = \sqrt{x}$ (6 marks).

b:- Use the Substitution Formula to evaluate the integral. $\int_{-\pi}^{\pi} \frac{\cos x}{\sqrt{4+3\sin x}} dx$ (7 marks).

c:- Use the shell method to find the volumes of the solids generated by revolving the regions bounded by the curves and lines, about the x-axis, as shown. (7 marks).

$y = \sqrt{x}$, $y = 0$, $y = x - 2$



Q5) **a:-** Find a formula for f^{-1} in case $f(x) = x^2 + 1,\ x \geq 0$. (5 marks).

- Find the derivative of y, $y=e^{(4\sqrt{x}+x^2)}$ (5 marks).

b:- Evaluate the integral, $\int_1^4 \frac{log2^x}{x} dx$ (5 marks).

- Evaluate the expression, $\sin(tan^{-1}\frac{x}{\sqrt{x^2+1}})$. (5 marks).

Q6) **a:** - express the integrands as a sum of partial fractions and evaluate the integral.

$$\int_0^1 \frac{3x+2}{(x+1)^2} dx$$ (8 marks).

b:- using Tabular integration Evaluate $\int x^2 sinx\ dx$ (5 marks).

c:- By Cramer's Rule Solving the following systems of equations. (7 marks).

$$\begin{aligned} 2x + y - z &= 5 \\ 3x - 2y + 2x &= -3 \\ x - 3y - 3z &= -2 \end{aligned}$$

.....GOOD LUCK.....