Benha University Faculty of Engineering – Shoubra Department of Industrial Engineering Course: Mathematics 2 Code: EMP 102		Final Exam Date : January 18 , 2017 Answer **All** questions Duration: 2 hours
• The exam consists of one page	• No. of questions: 4	Total Mark: 40

Question 1 6

Find **y`** from the following:

(a) $y = 2^x - \cosh x$ (b) $y = x^4 + \sinh x$ (c) $y = \sin^{-1} x + \tanh^{-1} x$

(d) $y = \sin x \,.\ln x$ (e) $y = 8x - \tanh x$ (f) $y = e^x + \tan^{-1} x$

Question 2 12

Find the integrals:

(a) $\int (x^4 - 3^x)\, dx$ (b) $\int (\sinh 2x + \cosh x)\, dx$ (c) $\int (\frac{1}{x} + \frac{2}{x+3})\, dx$ (d) $\int \frac{x}{x^2-6x+5} dx$

Question 3

(a)Find the area of the region between the curve $y = x^3 + 2$, x-axis, x in [0, 2]. 3

(b)If the region between the curve $y = 1 + x^3$, x-axis, x in [1, 2] is rotated about 6

(i) x-axis (ii)y-axis. Find the volume of the generated solids V_x , V_y.

(c)Separate the lines and find the angle between them : $x^2 - 6xy + 5y^2 = 0$. 2

Question 4

(a)State the definition of the line. 1

(b) State the definition of the parabola. 1

(c)Write the equation of circle where the points (2, – 1) and radius 3. 3

(d)Determine the vertex , focus and sketch the parabola : $x^2 - 4x - 8y - 4 = 0$. 3

(e)Find center, vertices and sketch the ellipse : $x^2 + 4y^2 - 4x - 8y + 4 = 0$. 3

Good Luck *Dr. Mohamed Eid*

Model Answer

Answer of Question 1

(a) $y` = 2^{x}.\ln 2 - \sinh x$ (b) $y` = 4x^3 + \cosh x$

(c) $y` = \frac{1}{\sqrt{1-x^2}} + \frac{1}{1-x^2}$ (d) $y` = \cos x\,.\ln x + \sin x\,.\frac{1}{x}$

(e) $y` = 8 - \ \mathrm{sech}^2 x$ (f) $y` = e^{y} + \frac{1}{1+x^2}$

----------*6- Marks*

Answer of Question 2

(a) $I = \frac{x^5}{5} - \frac{3^x}{\ln 3} + c$

(b) $I = \frac{1}{2}\cosh 2x + \sinh x + c$

(c) $I = \ln x - 2\ln(x+3) + c$

(d) $I = \int(\frac{5/4}{x-5} - \frac{1/4}{x-1})\,dx = \frac{5}{4}\ln(x-5) - \frac{1}{4}\ln(x-1) + c$

----------*12- Marks*

Answer of Question 3

(a) $A = \int_0^2 (x^3 + 2)dx = 8$

----------*3- Marks*

(b)(i) $V_x = \pi \int_1^2 (x^3+1)^2\,dx = 26.64\pi$

(ii) $V_y = 2\pi \int_1^2 x(x^3+1)\quad dx = 15.4\pi$

----------*6- Marks*

(c) $x^2 — 6xy + 5y^2 = (x-y)(x-5y) = 0$

The two lines are : x – y = 0 , x – 5y = 0 and $\tan\theta = \frac{1-\frac{1}{5}}{1+\frac{1}{5}} = -\frac{4}{6}$

----------*2- Marks*

Answer of Question 4

(a)Line (b)Parabola

----------2- *Marks*

(c)The circle : $(x-2)^2+(y+1)^2=9$

----------3- *Marks*

(d)We get $(x-2)^2=8(y+1)$. It is vertical parabola.

The vertex is $(2,-1)$, $a=2$, focus is $(2,1)$.

----------3- *Marks*

(e) We get $\frac{(x-2)^2}{4}+\frac{(y-1)^2}{1}=1$. It is ellipse, $a=2$, $b=1$ and the center $(2,1)$.

The ends of major are $(0,1)$, $(4,1)$ and the ends of minor are $(2,0)$, $(2,2)$.

----------3- *Marks*

Dr. Mohamed Eid