Arab Academy for Science, Technology & Maritime Transport

College of Engineering &Technology

Final Examination Paper

Department	Basic & Applied Science	**Date**	31/05/2014
Lecturer	Course coordinator : Dr. Allam Abdelaziz	**Marks**	40
Course Title	Mathematics 1	**Time Allowed**	2 hours
Course Code	BA123	**Start Time**	09:00-11:00

Q1 : Find $\frac{dy}{dx}$ for $y = \tan^{-1}(\cos x) + \cot^{-1}(\sin x)$

3 Marks

Q2 : Find $\frac{dy}{dx}$ for $y = \left(\frac{(x-1)^3 (1-\sin x)^4}{x^x (2-\cos x)^2} \right)^3$

4 Marks

Q3 : If $y = \tan(cos^{-1}x)$, Prove that $y' = \frac{-(y^2+1)}{\sqrt{1-x^2}}$

4 Marks

Q4 : **Find** $\frac{dy}{dx}$ **for** $y = e^{-x} + e^{y}$

3 Marks

Q5 : **Evaluate the following limit** $\lim_{x \to \pi/2} (\sec x - \tan x)$

3 Marks

Q6 : Evaluate the following limit $\lim_{x \to o} (\cos x)^{1/x^2}$

4 Marks

Q7 : If $x = cos\, t$ and $y = sec^4\, t$, Show that $y'' = 20\, x^{-6}$

4 Marks

Q8 : Using Maclaurin's expansion, Show that

$$\sinh x + \cosh x = 1 + x + \frac{x^2}{2} + \frac{x^3}{6} + \frac{x^4}{24} + \ldots$$

5 Marks

Q9 : If $z = ln\left(x^2 + y^2\right)$, **show that** $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = 0$.

5 Marks

Q10 : Discuss and sketch the curve $y^2 - 4x - 2y + 9 = 0$

5 Marks