


Benha University Faculty of Engineering- Shoubra Eng. Mathematics & Physics Department Preparatory Year (تخلفات)		Final Term Exam Date: December 26, 2015 Course: Mathematics 1 – A Duration: 3 hours
<ul style="list-style-type: none"> The Exam consists of one page Answer All Questions 	<ul style="list-style-type: none"> No. of questions: 4 Total Mark: 100 	
Question 1		24
Find y' from the following:		
(a) $y = x^4 + 2x^2 + 3x$	(b) $y = \cosh x^2 \cdot \sec 2x$	
(c) $y = \cos x^2 - \ln \sin x$	(d) $y = \tan^{-1}x + \tan^{-3}x$	
(e) $y^4 = x \log(x + y)$	(f) $y = t \sec t, x = t \sinh t$	
Question 2		
(a) Find the following limits:		
(i) $\lim_{x \rightarrow 1} \frac{\sqrt{x} - 1}{x^7 - 1}$	(ii) $\lim_{x \rightarrow 0} \frac{\ln(1 + 3x)}{2^x - 3^x}$	(iii) $\lim_{x \rightarrow 0} \frac{x - \sin x}{x^3 + x^2}$
(iv) $\lim_{x \rightarrow \infty} \frac{x^8 + 2x}{x + x^9}$		12
(b) Write the Maclurin's series of the function: $f(x) = x \sin x$.		4
(c) Show that : $\tanh^{-1} x = \frac{1}{2} \ln \frac{1+x}{1-x}$.		4
(d) Determine the extrema of : $f(x) = x^3 - 6x^2$ $g(x) = x^3 + 3$		6
Question 3		
Integrate the following:		
(a) $\int \frac{x^3}{(4-x^2)^{1/2}} dx$	(b) $\int \frac{\sin x + \cos x}{\sin x - \cos x} dx$	30
(c) $\int \frac{e^x - e^{-x}}{e^x + e^{-x}} dx$	(d) $\int \tan^4 x dx$	
(e) $\int x \sqrt{(x^2 + 1)} dx$	(f) $\int e^{3x} \sinh 2x dx$	
Question 4		
(a) Find the area of the surface of revaluation generated by revolving about x -axis the cycloid $x = a(t - \sin t), y = (1 - \cos t), 0 \leq t \leq 2\pi$		7
(b) Find the area bounded by the curves: $y = x^3, x = 2, x = 5, y = 0$.		7
(c) Find the volume generated by revolving, about x -axis, the area bounded by: $y = x^2, y = 0, x = 10$		6

Good Luck

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