


Benha University Faculty of Engineering- Shoubra Eng. Mathematics & Physics Department Preparatory Year (تخلفات)		Final Term Exam Course: Mathematics 1 – B Date: June 15, 2019 Duration: 3 hours	
The Exam consists of one page	Answer All Questions	No. of questions: 4	Total Mark: 100
Question 1			
(a) Find y' : (i) $y = \tanh x \cdot \sinh x + \sin^{-1} x$	(ii) $y^3 = \tan^{-1} x \cdot \sinh^{-1} x$	4	
(b) Find the following integrals :			27
(i) $\int \left(\frac{1}{\sqrt{1+x^2}} - \frac{1}{\sqrt{1-x^2}} \right) dx$	(ii) $\int \left(\frac{1}{x^2+1} + \frac{1}{\sqrt{x^2-1}} \right) dx$	(iii) $\int x \ln x dx$	
(iv) $\int \tanh^{-1} x dx$	(v) $\int \frac{x+3}{x^2-x-2} dx$	(vi) $\int \frac{2}{x^2+2x+2} dx$	
(vii) $\int \frac{x}{\sqrt{x+1}} dx$	(viii) $\int \sin 2y \cdot \cos 3y dy$	(ix) $\int_0^\pi (\sin z)^6 dz$	
Question 2			
(a) Find the arc length of the curve : $y = 1 + x^3$, x in $[1, 2]$.			4
(b) Find the area of the region between the curve: $y = x^2 - 2x$, x -axis, x in $[1, 3]$			4
(c) If the curve $y = e^x$, y in $[2, 3]$ is rotated about y – axis. Find the surface area S_y .			4
(d) If the region between the curve $y = 3^x$, x -axis, x in $[1, 3]$ is rotated about : x – axis , y -axis. Find the volume of the generated solids V_x, V_y .			7
Question 3			
(a) Find the equation of circle which intersects the circles $x^2 + y^2 + 2x - 2y + 1 = 0$, $x^2 + y^2 + 4x - 4y + 3 = 0$ orthogonally and its center lies on the line $3x - y - 2 = 0$.			10
(b) Find coordinates of vertex, focus, directrix of $x^2 - 2x - 4y - 15 = 0$.			10
(c) Find the value of k such that $2x^2 - 4xy + 2y^2 + x + ky - 1 = 0$ represents pair of straight lines, and find the distance between them.			10
Question 4			
(a) What is the equation of the diameter bisecting the chords having equal slope of $\frac{3}{2}$ of the ellipse $4x^2 + 9y^2 = 144$?			5
(b) Find the distance from the point $(2, 1, -2)$ to the line $\frac{x-3}{-2} = \frac{y+4}{3} = \frac{z-1}{2}$.			5
(c) Find equation of tangent to hyperbola $2x^2 - y^2 + 4x + 4y - 10 = 0$ at $(1, 2)$.			10