LAGOS CITY POLYTECHNIC, IKEJA
SCHOOL OF ENGINEERING AND APPLIED SCIENCE

DEPARTMENT OF ELECT./ELECT. AND COMPUTER ENGINEERING

2015/2016 SEMESTER EXAMINATION

COURSE TITLE: ADVANCED ALGEBRA   NO OF QUESTIONS: 6

COURSE CODE: MTH 311   TIME ALLOWED: 2HRS

FOR WHOM: HND YR I CS, CE, EE PT   INSTRUCTIONS: ANSWER ANY FOUR QUESTIONS

1. (a) Show tyhat $1 + \sin x = 1 + x + \dfrac{x^2}{2} + \dfrac{x^3}{8} + \dfrac{x^4}{48} + \dfrac{}{384} + \ldots\ldots\ldots\ldots$

   (b) Using Maulaurin series, derive the series expansion of coshx

2. (a) Solve the following system of equation using Gauss-Jordan elimination method
   $$3x + 2y + 4z = 7$$
   $$2x + y = z = 4$$
   $$x + 3y + 5z = 2$$

   (b) If λ_1, λ_2 and λ_3 are the agenvalues of the matrix

2	9	5
5	10	7
4	21	14

   than $\lambda_1 + \lambda_2 + \lambda_3$ is equal to?

3. (a) Given that $z_1 = 2 + 3i$ and $z_1 = 4\ 5i$. Evaluate the followings in the form $x + iy$
   (i) $(5z_1 + 3z_2)^2$ (ii) $(z_1 + z_2)$
   $$(z_1\ z_2)$$

   (b) Given that $x = \cos\theta + i\sin\theta$, using Dc Movre theorem show that
   $$x^m + \frac{1}{x^m} = 2\cos m\theta \quad \text{and} \quad x^m\ \frac{1}{x^m} = 2i\sin m\theta$$

4. (a) For what value of x will make $(i + 2j + 8k)$ and $(xi + 3j\ k)$ perpendicular
   (b) Evaluate grad θ if $\theta = \log(x^2 + 2y^2 + 2z^2)$
   (c) Find the divergence and curl of the vector field $v = (x^2\ y^2)i + 2xyj + (y^2\ xy)k$

5. (a) Define the following functions with their properties
   (i) Trigonometric function   (ii) Hyperbolic function   (iii) Logarithmic function

   (b) Show that
   $$\text{Sin } x + \sin y = 2\left[\sin \frac{x+y}{2}\right]\left[\cos \frac{x\ y}{2}\right]$$

   $$\text{Cosh}x = \quad \sin h^2 x + 1 = \frac{1}{1\ \tanh^2 x} = \frac{\coth x}{\coth^2 x\ 1}$$

6. (c) If $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ choose α and β so that
   $$(\alpha I + BA)^2 = A$$