# ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD
**(Department of Mathematics & Statistics)**

## WARNING

1. **PLAGIARISM OR HIRING OF GHOST WRITER(S) FOR SOLVING THE ASSIGNMENT(S) WILL DEBAR THE STUDENT FROM AWARD OF DEGREE/CERTIFICATE, IF FOUND AT ANY STAGE.**
2. **SUBMITTING ASSIGNMENTS BORROWED OR STOLEN FROM OTHER(S) AS ONE'S OWN WILL BE PENALIZED AS DEFINED IN "AIOU PLAGIARISM POLICY".**

**Course: Mathematic-1 (1307)** | **Semester: Spring, 2014**
**Level: F.A/F.Sc** | **Total Marks: 100**
**Pass Marks: 40**

## ASSIGNMENT No. 1
**(Units 1–5)**

***Note: Attempt all questions and each question carries equal marks.***

Q.1 a) Solve the following systems by reducing their augmented matrices to the echelon form and reduced echelon form.

i) $x_1 - 2x_2 - 2x_3 = -1$
$2x_1 + 3x_2 + x_3 = 1$
$5x_1 - 4x_2 - 3x_3 = 1$

ii) x + 2y +z = 2
2x +y +2z = -1
2x + 3y –z = 9

b) Solve the following system of linear equations by Cramer's rule.
$2x_1 - x_2 + x_3 = 8$
$x_1 + 2x_2 + 2x_3 = 6$
$x_1 - 2x_2 - x_3 = 1$

Q.2 a) If $\alpha, \beta$ are the roots of the equation $x^2 - px - p - c = 0$, Prove that $(1+\alpha)(1+\beta) = 1 - c$

b) If $\omega$ is a root of $x^2 + x + 1 = 0$, Show that its other root is $\omega^2$ and prove that $\omega^3 = 1$

Q.3 a) Simplify the following
i) $(a - bi)^3$ ii) $(3 - \sqrt{-4})^{-3}$

b) Prove that $\bar{Z} = Z$ if and only if Z is real.

c) Prove that $\sqrt{29}$ is an irrational number.

Q.4 a) Determine whether each of the following is a tautology , a contingency or an absurdity
i) $p \wedge \sim p$ ii) $p \rightarrow (q \rightarrow p)$ iii) $q \vee (\sim q \vee p)$

b) Prove that all $2 \times 2$ non singular matrices over the real field form a non-abelian group under multiplication.

Q.5 a) If A = $\begin{bmatrix} i & 1+i \\ 1 & -i \end{bmatrix}$, show that

i) A + $(\bar{A})^t$ is hermitian ii) A - $(\bar{A})^t$ is skew hermitian

b) Show that the roots of the equation $px^2 - (p-q)x - q = 0$ will be rational.

# ASSIGNMENT No. 2

## (Units 5–9)

***Note: Attempt all questions and each question carries equal marks.***

Q.1 a) Find the five numbers in A.P. whose sum is 25 and the sum of whose squares is 135.

b) If y=$\frac{x}{2} + \frac{1}{4}x^2 + \frac{1}{8}x^3 + \ldots$ and if $0 < x < 2$ then prove that $x = \frac{2y}{1+y}$

Q.2 a) Determine probability of getting two heads in two successive tosses of a balanced coin.

b) A die is thrown twice. What is the probability that the sum of the number of dots shown is 3 or 11?

c) Find the values of n and r, when ${}^nC_r$ = 35 and ${}^nP_r$ = 210

Q.3 a) Resolve the following into partial fractions:

i) $\frac{x^3+2x+2}{(x^2+x+1)^2}$

ii) $\frac{8x^2}{(x^2+1)^2(1-x^2)}$

b) If H.M and A.M between two numbers are 4 and $\frac{9}{2}$ respectively, find the numbers.

Q.4 a) Sum the series $\frac{1^2}{1} + \frac{1^2+2^2}{2} + \frac{1^2+2^2+3^2}{3} + \cdots$ to n terms.

b) If $S_2$, $S_3$, $S_5$ are the sums of 2n, 3n,5n terms of an A.P, Show that $S_5$=5($S_3 - S_2$)

c) The A.M between two numbers is 5 and their (positive) G.M is 4. Find the numbers.

Q.5 a) Use binomial theorem to find the values of $\sqrt[4]{17}$ *and* $(0.998)^{-\frac{1}{5}}$

b) Use mathematical induction to prove $1^2 + 3^2 + 5^2 + \ldots + (2n-1)^2 = \frac{n(4n^2-1)}{3}$ for every positive integer n.