COMILLA UNIVERSITY

Department of Computer Science & Engineering 2nd Year 1st Semester Final Examination '13

Course Code: MATII-215

Course Title: Algebra, Trigonometry and Matrices

Full Marks: 60

Time: 3 Hours

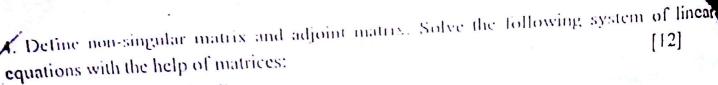
Answer any five questions.

N. B. Figures in the right margin indicate marks

V(a) Define Set, Empty Set, Union sel Set, Power Set. (b) If $A=\{1,2,3\}$, $B=\{x: x \text{ is a prime number less than or equal } 13\}$, $C=\{x, y, z\}$ then find i) BxC, ii) C-B, iii) $A \cap B$, iv) (C $\cap B$) $\cap A$ [4] (c) State and prove De Morgan's laws. 2/(a) What do you mean by relation, equivalence relation and partial order relation? [3] (b) Define with examples i) Mapping, ii) Onto mapping, iii) Into mapping and iv) Inverse function (c) Find the domain and range of the following functions defined by the rules: i) f(x) = [x-1] x^2 when x<0ii) f(x) =x, when $0 \le x \le 1$ [5] 1/x, when x>1 3. (a) State the Cramer's rule. Also solve the following system of linear equations by using [2+3]Cramer's rule. 2x+3y+4z=1195x-6y+7z=808x+9y+10z=353(b) Define rank of matrix. Find the rank of the matrix [4] 1021 0242 0221

(c) Prove that every square matrix can be uniquely expressed as the sum of the symmetric and skew symmetric matrix.

[3]



- S. (a) State and prove De Moivre's theorem.
 - (b) Solve the equation $x^4 + x^2 + y = 0$ with the help of De Moivre's theorem.
- [8] (a) Expand $\cos \alpha$ and $\sin \alpha$ in ascending power of α . (b) Show that $1 - \frac{2}{3!} + \frac{3}{5!} - \frac{4}{7!} + \dots + \frac{10000 - \frac{1}{\sqrt{2}} \sin(\frac{\pi}{4} + 1)}{\sqrt{2}}$ [4]
- 7. (a) State the Decarte's rule of sign and also find the nature of the roots of the equation $-4x^{7}+x^{3}-x^{2}+2=0$
- (b) Find the equation whose roots are the roots of the equation $x^5+4x^3-x^2+11=0$, each decreased by 3. [2]
 - (c) Write the process of synthetic division.
- **8.** (a) Find the nature of the roots of the equation $6x^4-25x3+81x2-9x-13=0$ by using Decarte's rule of signs.
 - (b) If α , β , λ are the roots of the equation $x^3 px^2 + qx r = 0$, obtain the equation whose

(b) If
$$\alpha$$
, β , λ are the roots of the equation (6) roots are $\beta\lambda + \frac{1}{\alpha}$, $\lambda\alpha + \frac{1}{\beta}$, $\alpha\beta + \frac{1}{\lambda}$