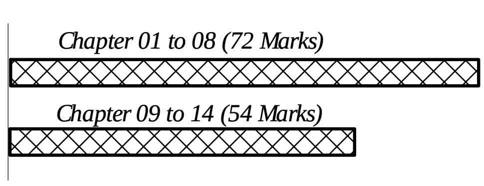
mathcity.org Merging man and maths	**Federal Board - Annual 2005** Paper I Mathematics Paper-I , Time Allowed: 2.40 Hours Max. Marks: 80 , Available online @ http://www.mathcity.org/fsc

Section –B ($4 \times 10 = 40$ marks)	
Q # 2 (i) By using De Moivre's theorem, find real and imaginary parts of $(\sqrt{3}+i)^3$. **OR** Prove that every element of a group $(G,*)$ has a unique inverse.	Ex 1.3 – Exp5(i) – p27 Ex 2.8 – Th. – p78
(ii) Find the value of x if $\begin{vmatrix} 1 & x-1 & 3 \\ -1 & x+1 & 2 \\ 2 & -2 & x \end{vmatrix} = 0$. **OR** Find a vulgar fraction equivalent to the recurring decimal $0.\dot{1}5\dot{9}$	Ex 3.3 – 6(ii) – p113 Ex 6.8 – 6(v) – p215
(iii) Using binomial theorem, find the value of $\frac{1}{\sqrt[3]{998}}$ to three places of decimals. **OR** Find the probability that the sum of dots appearing in two successive throws of two dice is every time 7.	Ex 8.3 – 2(vi) – p283 Ex 7.8 – 8 – p255
(iv) If α , β are the roots of $5x^2 - x - 2 = 0$, form the equation whose roots are $\frac{3}{\alpha}$ and $\frac{3}{\beta}$.	Ex 4.6 – 8 – p164
(v) Resolve $\frac{4x}{(x+1)^2(x-1)}$ into partial fraction.	Ex 5.2 – 3 – p185
(vi) Find the value of the trigonometric functions of $\frac{-71}{6}\pi$, with out using calculator.	Ex 9.3 – 6(viii) – p309
(vii) If α , β , γ are the angles of a triangle ABC, Show that; $\cot\frac{\alpha}{2} + \cot\frac{\beta}{2} + \cot\frac{\gamma}{2} = \cot\frac{\alpha}{2}\cot\frac{\beta}{2}\cot\frac{\gamma}{2}$	Ex 10.2 – 12 – p328
(viii) Prove that: $\frac{1}{r^2} + \frac{1}{r_1^2} + \frac{1}{r_2^2} + \frac{1}{r_3^2} = \frac{a^2+b^2+c^2}{\Delta^2}$	Ex 12.8 – Exp3 – p383
(ix) Solve the equation: $\tan^2\theta = \frac{1}{3}$.	Ex 14 – 2(i) – p407
(x) Prove that: $Sin^{-1}x = \frac{\pi}{2} - Cos^{-1}x$ **OR** Show that cosine function is periodic of period 2π .	Ex 13.2 – Exp6(i)-p397 Ex 11.1 – Note(i)-p340 (Not Proved in book)



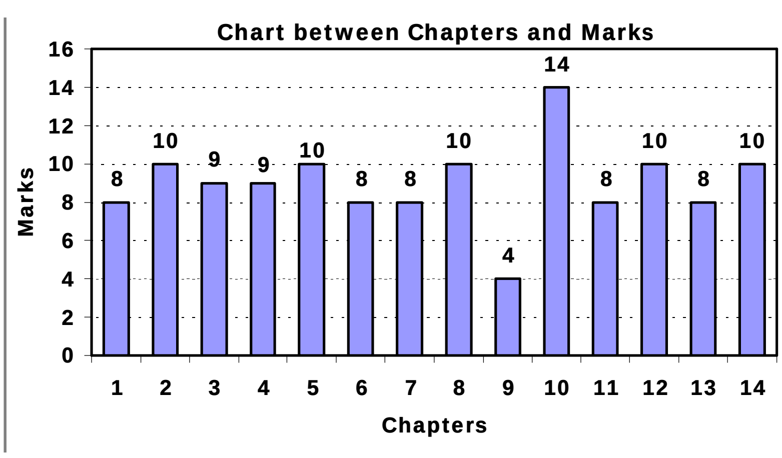
Relation between trigonometric and non-trigonmetric portion.

PTO

Section C (40 Marks)

Note: *Attempt any four questions. Graph paper will be supplied on demand.*

Q # 3 (a) Define a tautology and prove that $\sim q \wedge (p \to q) \to \sim p$ is a tautology. **6** **(b)** Show that $\overline{z_1 z_2} = \overline{z_1} \cdot \overline{z_2}$, for nay complex numbers z_1 and z_2.	Ex 2.4 – 3(iv) – p55 Ex 1.3 – Exp3 – p24
Q # 4 (a) Define rank of matrix and find rank of $\begin{bmatrix} 1 & -1 & 2 & 1 \\ 2 & -6 & 5 & 1 \\ 3 & 5 & 4 & -3 \end{bmatrix}$. **(b)** To complete a job, A and B take 4 days working together, A alone take twice as long as B alone to finish the same job. How long would each one alone take to do the job? **5**	Ex 3.4 – 10(i) – p127 Ex 4.10 – 18 – p177
Q # 5 (a) For what value of n is $\dfrac{a^n + b^n}{a^{n-1} + b^{n-1}}$, the positive G.M between a and b. **4** **(b)** If $2y = \dfrac{1}{2^2} + \dfrac{1 \cdot 3}{2!} \cdot \dfrac{1}{2^4} + \dfrac{1 \cdot 3 \cdot 5}{3!} \cdot \dfrac{1}{2^6} + \ldots\ldots,$ then prove that; $4y^2 + 4y - 1 = 0$. **6**	Ex 6.7 – 6 – p209 Ex 5.3 – Exp2 – p186
Q # 6 (a) Find the number of arrangements of 3 books on English and 5 books on Urdu for placing them on a shelf such that the books on the same subject are together. **4** **(b)** If x is nearly equal to 1, then prove that $px^p - qx^q \approx (p-q)x^{p+q}$. **6**	Ex 7.2 – 13 – p236 Ex 8.3 – 12 – p284
Q # 7 (a) If α, β, γ are angles of a triangle ABC, prove that $\tan\dfrac{\alpha}{2}\tan\dfrac{\beta}{2} + \tan\dfrac{\beta}{2}\tan\dfrac{\alpha}{2} + \tan\dfrac{\gamma}{2}\tan\dfrac{\gamma}{2} = 1$ **5** **(b)** Reduce $\sin^4\theta$ to an expression involving only functions of multiple of θ, raised to the first power. **5**	Ex 10.2 – Exp5(ii) – p324 Ex 10.3 – 14 – p332
Q # 8 (a) Draw graph of $y = \cos\dfrac{x}{2}$, $x \in [-\pi, \pi]$. **4** **(b)** With usual notation, prove that; $r_2 = \dfrac{\Delta}{s-b}$. **6**	Ex 11.2 – 1(vi) – p351 Ex 12.8 – Art – p381
Q # 9 (a) Prove that $\tan^{-1} A + \tan^{-1} B = \tan^{-1}\left(\dfrac{A-B}{1+AB}\right)$. **4** **(b)** Find the solution set of the equation; $\tan 2\theta + \cot\theta = 0$ **6**	Ex 13.2 – Exp6 – p399 Ex 14 – 12 – p407



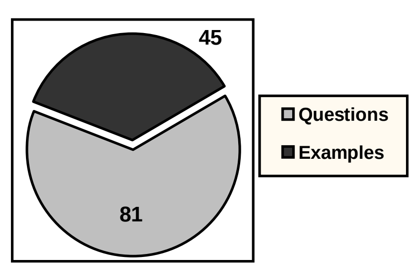


Chart between questions from exercises and examples (not from exercises)