Uva Wellassa University, Sri Lanka
End Semester Examination – March 2010
SCT 104-2 Essential Mathematics

Time: Two (02) hours

Total **five (05)** questions.
Answer **four (04)** questions only.
Each question carries **equal** marks.

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01. (i) Find the solutions of x_1 and x_2 for the equation of $ax^2+bx+c=0$. *where* $a \neq 0$

(ii) Using part (i) show that ;

a.) $x_1 + x_2 = -\dfrac{b}{a}$ *b.)* $x_1 \cdot x_2 = \dfrac{c}{a}$

(iii) Solve the equation $x^2 - 5x + 50 = x - 8$

(iv) If $Z_1 = \dfrac{1}{2} + i$ and $Z_2 = -1 + \dfrac{1}{3}i$, then find $\dfrac{Z_1}{Z_2}$

02. (i) Find the partial fractions of $\dfrac{4(x^2 - x + 1)}{(x-1)(x^2-1)}$

(ii) If $A = \begin{pmatrix} -1 & 1 \\ 2 & -2 \end{pmatrix}$ and $B = \begin{pmatrix} 3 & -2 \\ -1 & 2 \end{pmatrix}$ show that $(A \cdot B)' = B' \cdot A'$

03. (a) (i) Find $\log_7\left(\dfrac{1}{49}\right)$

(ii) Find possible value(s) that satisfies the equation $\log_a 36 = 2$

(iii) Show that $\log_a b \cdot \log_b c = \log_a c$

(b) (i) Solve $|6 - 5x| \geq 16$

(ii) Solve and Graph $3(x^2+1) \leq 2 + 2x - 3x^2$

04. (i) Find ${}^{8}C_{3}$ (Show your calculations.)

(ii) How many words can be made using the letters of the word " WELLASSA ".

(iii) Expand $\left(x^2+\frac{1}{x^2}\right)^4$

(iv) Find the forth term of $\left(2-\frac{1}{x^2}\right)^7$

05. (a) (i) Convert 135 degrees into radians.

(ii) Convert $\frac{13\pi}{12}$ radians into degrees.

(iii) Convert 24.243° into DMS (Degree Minute Second) form.

(iv) Convert $56^\circ 57' 58''$ into DD (Decimal Degree) form.

(b) (i) Prove the identity $\frac{1+\tan A}{1+\cot A}=\tan A$

(ii) Using your knowledge of Sum and Difference formulas and Double Angle formulas derive the expression for $\sin 3x$.
(Keep the answer with one parameter)