9/2/2013

Course Name : MATH ZC161
Course Title : Engineering Mathematics - I
Nature of Exam : Closed Book
Weightage : 35%
Duration : 2 Hours   No. of Pages = 01
Date of Exam : 09/02/2013 (AN)   No. of Questions = 05

Note:

1. Please follow all the Instructions to Candidates given on the cover page of the answer book.

2. All parts of a question should be answered consecutively. Each answer should start from a fresh page.

3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Q. 1. Suppose $A = \begin{pmatrix} 2 & 1 \\ 6 & 3 \\ 2 & 5 \end{pmatrix}$. Show that the matrix $B = AA^T$ is symmetric.   [6]

Q. 2. Solve the following system of equations by Cramer's rule

$$x_1 - 2x_2 - 3x_3 = 3$$

$$x_1 + x_2 - x_3 = 5$$

$$3x_1 + 2x_2 \quad\quad = -4.$$ [8]

Q. 3. Find the eigenvalues and eigenvectors of the matrix $A = \begin{pmatrix} 4 & 8 \\ 0 & -5 \end{pmatrix}$.   [7]

Q. 4(a). Evaluate the following limit:

$$\lim_{x \to 1} \frac{x^2 + x - 2}{x^2 - x}$$ [4]

(b). Find $\dfrac{dy}{dx}$ where $y = \dfrac{x^2 + \sin x}{x^3 + \cos x}$.   [4]

Q. 5. Evaluate the following integral:

$$\int \frac{x+4}{x^3 + 3x^2 - 10x}\,dx.$$ [6]

$-20 - 4\lambda + 5\lambda + \lambda^2$

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