MODEL: C

KING ABDULAZIZ UNIVERSITY

DEPARTMENT OF MATHEMATICS

Exam/Course: Exam II - Math-204

Student Name: **Student University Number:**

Instructor Name: **Section:**

Time Allowed: 90 Minutes **December 25, 2010**

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$(Q1)$ **Select the correct response with writing the details:**

(i) If $y_1, y_2, ..., y_k$ is any set of k linearly independent solutions of a homogeneous linear differential equation of order n, then $y = C_1y_1 + C_2y_2 + ... + C_ky_k$ is

□ a solution □ the general solution □ not a solution $(3Pt.)$

(ii) A particular solution y_p of $y''' + y' = 1 + \sin x$ is of the form $(5Pt.)$

□ $y_p = C_1 + C_2x\sin x + C_3x\cos x$ □ $y_p = C_1 + C_2\sin x + C_3\cos x$ □ $y_p = C_1x + C_2x\sin x + C_3x\cos x$

(iii) The general solution of $y^{(n)} = 0$ is a polynomial of degree

□ n □ n-1 □ n+1 $(3Pt.)$

(iv) According to the **Existence and Uniqueness Theorem** the IVP:

$ay'' + by' + cy = 0; a \neq 0, b, c \in \mathbb{R}, \; y(x_0) = y_0, \; y'(x_0) = y_1$ has

□ one solution □ an infinitely many solutions □ no solution (5Pt.)

(Q_2) **Solve:**

$$\begin{cases} \frac{dx}{dt} = x - y \\ \frac{dy}{dt} = 2x - y \\ x(\pi) = 0, \quad y(\pi) = 1. \end{cases}$$

(11 Pt.)

(Q_3) **Find the general solution of:** $x^2y''+xy'-y = \frac{1}{x+1}$ $(11Pt.)$

Answer only two of the following three questions:

(Q_4) **Solve:** $\frac{d^2x}{dt^2} - \omega^2 x = F_0 \sinh \omega t;\ x(0) = 1,\ x'(0) = 1,$ $(6Pt.)$

(Q_5) **Find the general solution of:** $(1+x^2)y''+2xy' = 0;\ y_1 = 1,$ $(6Pt.)$

(Q_6) **Find the general solution of:** $(x+2)^2y''+(x+2)y'+y = 0,$ $(6Pt.)$

Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Sum**	**Balance**