**MODEL:** $B$

**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 $y_1, y_2, ..., y_n$ is any set of solutions of a homogeneous linear differential equation of order $n$, then $y = C_1y_1 + C_2y_2 + ... + C_ny_n$ is

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

($ii$) A particular solution $y_p$ of $y''' - y' = 2 - \sinh x$ is ($5Pt.$)

☐ $y_p = Ax + C_1x\sinh x + C_2x\cosh x$ ☐ $y_p = Ax + C_1\sinh x + C_2\cosh x$ ☐ $y_p = Ax + C_1e^x + C_2e^{-x}$

($iii$) The general solution of $y''' = 0$ is

☐ a polynomial function ☐ an exponential function ☐ a trigonometric function ($3Pt.$)

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

$x^2y'' - 2xy' + 2y = 6;\ y(0) = 3;\ y'(0) = 1$ has

☐ one solution ☐ an infinitely many solution ☐ no solution ($5Pt.$)

($Q_2$) **Solve**

$$\begin{cases} \frac{dx}{dt} = -5x - y \\ \frac{dy}{dt} = 4x - y \\ x(1) = 0, \quad y(1) = 1. \end{cases}$$

(11 Pt.)

($Q_3$) **Find the general solution of:** $4y''-4y'+y = e^{\frac{x}{2}}\sqrt{1-x^2}$ ($11Pt.$)

**Answer only two of the following three questions:**

($Q_4$) **Find the general solution of:** $(1-x^2)y''+2xy' = 0;\ y_1 = 1,$ $(6Pt.)$

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($Q_5$) **Find the general solution of:** $(x-3)^2y''+(x-3)y'+y = 0,$ $(6Pt.)$

($Q_6$) **Solve:** $\frac{d^2x}{dt^2}+\omega^2 x = F_0 \sin \omega t;\ x(0)=1,\ x'(0)=1,$ $(6Pt.)$

| Q1 | Q2 | Q3 | Q4 | Q5 | Sum | Balance |
|---|---|---|---|---|---|---|
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