

> Kingdom of Saudi Arabia
> King $\mathcal{A}$ bduCaziz University

Faculty of Science -Mathematics Department Second Mid-Term Exam (90 Minutes) - (204 Math).

16/1/1433 H - 11/12/2011 A.D. First Semester 1432-1433 H

Model A

| Name: | Section: |
| :--- | :--- |
| Student's I.N. : | Serial Number: |
|  |  |


| $Q_{1}$ | $Q_{2}$ | $Q_{3}$ | $Q_{4}$ | $Q_{5}$ | Total Marks (25) |
| :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |

## (Answer the following questions)

| 1 | Choose the correct answer (writing details (iii) and (iv) only) [ [6 Marks] |
| :---: | :---: |
| (i) | The general solution of $\frac{d^{n} y}{d x^{n}}=0$ is <br> (a) an exponential function <br> (b) a polynomial function <br> (c) a trigonometric function |
| (ii) | A linear $n t h$-order differential equation of the form: $a_{n}(x) \frac{d^{n} y}{d x^{n}}+a_{n-1}(x) \frac{d^{n-1} y}{d x^{n-1}}+\cdots+a_{1}(x) \frac{d y}{d x}+a_{0}(x) y=g(x)$, is called <br> (a) homogeneous <br> (b) non homogeneous |
| (iii) | According to the Existence and Uniqueness Theorem the IVP: $a y^{\prime \prime}+b y^{\prime}+c y=0, a \neq 0, b, c \in R, y\left(x_{0}\right)=y_{0}, y^{\prime}\left(x_{0}\right)=y_{1}$ has <br> (a) unique solution <br> (b) an infinitely many solutions <br> (c) no solution |
| (iv) | The set of the functions $e^{x}, \cos x, \sin x$ is linear <br> (a) dependent <br> (b) independent |

2 A culture initially has $P_{0}$ number of bacteria. At $t=1$ hours the number of bacteria is measured to be $\frac{3}{2} P_{0}$. If the rate of growth is proportional to the number of bacteria $P(t)$ present at time $t$, determine the time necessary for the number of bacteria to triple.
[4 Marks]

$$
3 \text { Solve } y^{\prime \prime}-4 y=3 \sin 2 x
$$

[5 Marks]

4 Solve $y^{\prime \prime}+y=\sec x$
[5 Marks]

