國立高雄應用科技大學
100 學年度碩士班招生考試
土木工程與防災科技研究所（甲組）

准考證號碼□□□□□□□□□□ （考生必須填寫）

工程數學

注意：a. 本試題共 7 題，共 100 分。
b. 作答時不必抄題。
c. 考生作答前請詳閱答案卷之考生注意事項。

1. Solve $y'+y=e^x$, where $y'=\frac{dy}{dx}$. **(10%)**

2. We consider vertical motions of a mass-spring system (in Figure 1) with an external force $r(t)=F_0\cos\omega t$ (driving force), where *m*, *k*, *c* and F_0 are the mass, spring constant, damping constant and constant force, respectively. Now, the spring equation of overdamped forced motion is

$y''+6y'+5y=6\sqrt{5}\cos(\sqrt{5}t)$ with $y(0)=y'(0)=0$.

Please find the displacement function $y(t)$. **(20%)**

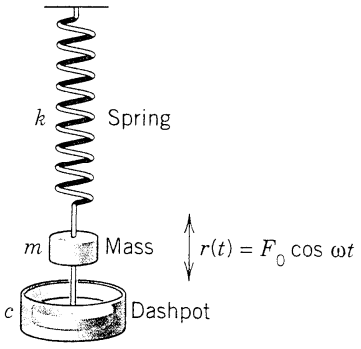

Figure 1

3. Find an equation of tangent plane to the surface of $z^2-2x^2-2y^2=12$ at the point $(1,-1,4)$. **(10%)**

4. Evaluate $\int_C xyz\,dx-\cos yz\,dy+xz\,dz$ over the straight-line segment from $(1,1,1)$ to $(-2,1,3)$. **(10%)**

5. Find the surface integral $\iint_S \vec{F}\cdot\vec{n}dS$ with $\vec{F}=(z-y)\vec{i}+y^3\vec{j}+2z^3\vec{k}$ and S the surface of $y^2+z^2\le 4$ and $-3\le x\le 3$. **(20%)**

6. Find the determinant of matrix $\mathbf{A}=\begin{bmatrix} 2 & 1 & -5 & 1 \\ 1 & -3 & 0 & -6 \\ 0 & 2 & -1 & 2 \\ 1 & 4 & -7 & 6 \end{bmatrix}$ **(10%)**

7. Compute $\mathbf{A}^{18}$ if matrix $\mathbf{A}=\begin{bmatrix} -1 & 0 \\ 1 & -5 \end{bmatrix}$. **(20%)**