國立中山大學106學年度碩士暨碩士專班招生考試試題

科目名稱：工程數學【光電所碩士班】　　題號：435001

※本科目依簡章規定「可以」使用計算機（廠牌、功能不拘）（選擇題）　　共1頁第1頁

單選題,答錯不扣分,每題10分,共十題.

1. $A=\begin{bmatrix}0&1&0&0\\0&0&1&0\\0&0&0&1\\1&0&0&0\end{bmatrix}$, $A^{42}=?$

(A) $\begin{bmatrix}0&1&0&0\\1&0&1&0\\0&1&0&1\\0&0&1&0\end{bmatrix}$ (B) $\begin{bmatrix}0&1&0&0\\0&0&1&0\\0&0&0&1\\1&1&0&0\end{bmatrix}$ (C) $\begin{bmatrix}0&0&1&0\\0&0&0&1\\1&0&0&0\\0&1&0&0\end{bmatrix}$ (D) $\begin{bmatrix}0&1&0&1\\1&0&1&0\\0&1&0&1\\0&0&1&0\end{bmatrix}$ (E) $\begin{bmatrix}0&1&0&1\\1&0&1&0\\0&1&0&1\\1&0&1&0\end{bmatrix}$

2. The inverse Laplace transform of the function $\frac{3s-137}{s^2+2s+401}$ is $e^{At}(3cosBt-7sinBt)$, where
(A) A=-1, B=-20, (B) A=-1, B=20, (C) A=1, B=-20, (D) A=1, B=20, (E) A=2, B=30.

3. A general solution for the equation $y'''-6y''+11y'-6y=3x$ is $ae^x+be^{2x}+ce^{Ax}+\frac{x}{B}-\frac{11}{12}$, where (A) A=3, B=2,(B) A=3, B=-2, (C) A=3, B=3, (D) A=3, B=-2, (E) none of the above.

4. Evaluate the volume of the tetrahedron defined by four vertices (1,0,-1), (3,0,2), (1,6,1), (4,3,-1).
(A) 66, (B) 33, (C) 22, (D) 11, (E) none of the above.

5. The Fourier transform of the function $f(x)=xe^{-x^2}$ does not include
(A) 2, (B) 4, (C) 6, (D) ω, (E) ω^2.

6. Find the smallest positive integers m and n such that $(\sqrt{3}+i)^m=(1+i)^n$, where
(A) m=3, n=6, (B) m=6, n=12, (C) m=9, n=18, (D) m=12, n=24, (E) none of the above.

7. Integrate $\oint_C \frac{\tan z}{z^2-1}dz$ counterclockwise around the C: $|z|=\frac{3}{2}$. The integral is
(A) 2π, (B) 2πi, (C) 2π tan 1, (D) 2πi tan 1, (E) none of the above.

8. Find $\oint_c (x^2+2y)dx+(4x+y^2)dy$ where C is the circle $x^2+y^2=1$.
(A) 2π, (B) -2π, (C) 6π, (D) -6π, (E) none of the above.

9. The residue of the complex function $f(z)=(z+2)e^{\frac{1}{z}}$ at z=0 is
(A) 1/2, (B) 1, (C) 3/2, (D) 2, (E) 5/2.

10. Find the analytic function $f(z)=u(x,y)+iv(x,y), where\ v(x,y)=e^{-3x}\sin 3y$
(A) $-e^{-3z}$, (B) e^{-3z}, (C) $-e^{3z}$, (D) e^{3z}, (E) none of the above.