國立中山大學104學年度碩士暨碩士專班招生考試試題

科目名稱：工程數學【材光系碩士班乙組】　　題號：439001

※本科目依簡章規定「可以」使用計算機（廠牌、功能不拘）　　

1. Find the general solution of $y^{iv}+4y=0, y(0)=\frac{1}{2}, y'(0)=-\frac{3}{2}, y''(0)=\frac{5}{2}, y'''(0)=-\frac{7}{2}$ (10%)

2. Solve the differential equation of $y'=\frac{1}{x}y^2+\frac{1}{x}y-\frac{2}{x}$ (15%)

3. Find the recurrence relation of $(1-x^2)y''-2xy'+n(n+1)y=0$ at $x=0$. n is a real number. (15%)

4. Solve the general solution in terms of J_v and Y_v for $x^2y''+(1-2v)xy'+v^2(x^{2v}+1-v^2)y=0$ (15%)

5. Solve the inverse Laplace transform of $\frac{s^2+2}{s^4-6s^3+32s}$. (10%)

6. Solve $\frac{\partial^2 u}{\partial r^2}+\frac{1}{r}\frac{\partial u}{\partial r}+\frac{1}{r^2}\frac{\partial^2 u}{\partial \theta^2}=0$ in the disk $r < R$ with $u(R,\theta)=f(\theta)$ (20%)

7. Solve by Laplace transforms: $\frac{\partial w}{\partial x}+2x\frac{\partial w}{\partial t}=2x, w(x,0)=1$ and $w(0,t)=1$ (15%)