Structure of MT255 Examination, June 2000

Note: The independent variable in all differential equations is time $t$.

1. Nonhomogeneous second order differential equations and nonhomogeneous first order systems (particular solutions by undetermined coefficients).

2. Finding Laplace transforms, inverse transforms and application to an initial value problem.

3. Forced oscillations (the Fourier series is given in the question).

4. (a) Nonconstant coefficient differential equation: given $y_1(t)$, find a second linearly independent solution $y_2(t)$. Then use variation of constants formula to solve a nonhomogeneous problem.
   
   (b) Input-output system and transfer functions.

5. (a) Classify the equilibrium of a first order linear system and sketch trajectories in the phase plane.
   
   (b) Find the critical points of a nonlinear system and classify them by linearization.