Exam is comprehensive:

15-20% 1.1-1.5 1st order DE's
2.1-2.3 applications, equilibrium solutions
15-25% 3.1-3.6 matrix algebra and determinants
4.1-4.5 vector space concepts
15-25% 5.1-5.6 linear DE's & spring applications
10-20% 6.1-6.2 eigenvalues & eigenvectors (applies heavily elsewhere)
15-25% 7.1-7.4 linear systems of DE's & tank & spring systems
15-20% 10.1-10.4 Laplace transforms; applications to DE's & DE systems

(integral & Laplace table from book covers will be provided)
(test is closed book/note; no graphing/lim alg calculators allowed)

Approximate percentage/topic:

- Modeling: spring, spring systems
  - Computational analysis (tanks)
  - Population, velocity models chapter 2
  - Geometric meaning of solutions to DE's & systems of DE's
    - Slope fields, equilibrium solutions, stability
    - Tangent vector fields (7.4)
  - Analytic solution methods for DE's & systems
  - 1st order DE's linear, separable
  - Higher order linear DE's: general form of soln to inhomogeneous
    problem, how to solve y'' with constant coeff's, use
    of Euler's formula, applications to mass-spring problems
  - Eigenvalues, eigenvector methods to solve
    \[
    \frac{dx}{dt} = Ax
    \]
    \[
    \frac{d^2x}{dt^2} = A^2 x + \cos\omega t
    \]
  - Laplace transforms to solve linear DE's & systems

Auxiliary tools: Laplace transform (def & methods)
Linear algebra:
  - Vocabulary:
    - Solving linear systems, matrices, inverses, matrix alg., ref, det, etc.
  - Linear operator:
    - General form of soln to \( L(x) = b \) if \( L \) is a linear operator