Mechanics of Materials-I
3rd Semester (Session 2009)
Mid Term Exam--- Paper Guidelines

Paper Date: 01-11-2010 Max. Marks: 30   Time Allowed: 60 Min

Contents:

CH #1 (Simple Stresses & Strains)

- Mechanics of solids
  a) Mechanics of rigid bodies
  i)   Statics ii)   Dynamics
  b) Mechanics of deformable bodies.
- Mechanics of fluids
  a) Hydrodynamics → Hydraulics (study of incompressible fluids)
  b)   Gas Dynamics (study of compressible fluids)
- Aerodynamics
- Mechanical Properties of Materials.
- Stress concept & explanation.
- Types of stress
  i.   Axial or Normal stress (tensile stress, compressive stress & strength of m/t.).
  ii.   Shear stress (examples & types of shear).
  iii.   Bearing stress.
- Design concentration.
- Factor of safety.
  - Ultimate load & ultimate stress.
  - Allowable load & allowable stress.
- Selection of appropriate F.O.S.
- Strain concept, types & explanation.
  - Normal/ linear, tensile, compressive strain.
  - Thermal stresses & strains.
- Young's modulus or modulus of elasticity.
- Shear modulus or modulus of rigidity.
- Poisson ratio; Linear & lateral strains.
- Stress strain diagrams for different materials (Ductile & Brittle).
- Class Problems

CH #2 (Torsion)

- Torsion
- Assumption for torsion formula.
- Derivation of torsion formula
  a) Solid shafts   b) Hollow shafts.
- Design of transmission shafts.
- Polar moment of inertia.
- Class Problems

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CH#3 (Geometrical Properties of Area)

➢ Centriod & centre of gravity
➢ 1st moment of area
➢ 1st moment of composite area.
➢ Centroid of a composite area.
➢ 2nd moment of area.
➢ Difference b/w moment of inertia & moment of area.
➢ Parallel axis theorem
➢ Perpendicular axis theorem & polar moment.
➢ Radius of gyration.

CH #1 -- Problem Sheet # 1 (Except Problem # 8, 12, 16)
CH#2 -- Problem Sheet # 2(Except Problem # 21 to 24, 26 to 34 & 40)
CH #3 -- Problem Sheet # 2(Except Problem #4, 8, 9, 13, 14)

Paper Distribution:
- **There will be 2 Qs, each of 15 Marks**
- **Q#1 : CH # 1 (15 marks)**
- **Q#2 : CH #2 (10 marks) and CH#3 (5 marks)**
- **Theory (0 - 15%)   Problems + Derivations (85-100%)**

NOTE: **Paper may not be from problem sheet but that will be similar to problem sheets & class problems.**

Best of Luck