1. Write down the following formulas and explain their assumptions and applications. (40%)

    (1) Elastic flexure formula.

    (2) Elastic torsion formula.

    (3) Euler's formula.

    (4) Hoop stress of a cylindrical vessel.

    (5) Castigliano's theorem

2. Explain the following terms. (40%)

    (1) Statically indeterminate.

    (2) Elastic curve of a beam under loading.

    (3) Saint –Venant's principle.

    (4) Redundant reaction.

    (5) Principle of superposition.

    (6) Poisson's ratio.

    (7) Prismatic beam.

    (8) Residual stresses.

    (9) Free-body diagram.

    (10) Section modulus.

    (11) Shear center (bonus point 5%)

    (12) Principal axes of strain (bonus point 5%)

3. There are a set of long bone (for example: femora). For simplicity, two material properties (i.e. modulus of elasticity E and Poisson's ratio ν) are to be determined for these femora . Describe your experimental design. (20%)