CE1001E ENGINEERING MECHANICS

CLASS SCHEDULE

Total lecture sessions: 39

1. Fundamentals of mechanics: Introduction, idealisations of mechanics

2. Vector and scalar quantities, equality and equivalence of vectors, laws of mechanics

3. Important vector quantities: Elements of vector algebra, position vector, moment of a force about a point

4. Moment of a force about an axis, the couple and couple moment, couple moment as a free vector

5. Addition and subtraction of couples, moment of a couple about a line

6. Equivalent force systems, translation of a force to a parallel position

7-9. Resultant of a force system, simplest resultant of special force systems, distributed force systems

10, 11. Equations of equilibrium, free body diagram

12-14. Free bodies involving interior sections, general equations of equilibrium

15. Problems of equilibrium, static indeterminacy

16. Introduction to structural mechanics, trusses, the structural model, the simple truss

17-20. Solution of simple trusses, method of joints, method of sections

21-24. Section forces in beams, Shear force, axial force and bending moment, SFD, BMD

25-27. Differential relations for equilibrium, various types of statically determinate beams

28-29. Chains and cables, coplanar cables, parabolic and catenary cables, elementary problems

30-32. Friction forces, laws of Coulomb friction, simple contact friction problems

33. Properties of surfaces, first moment of area and centroid, theorems of Pappus-Guldinus

34-35. Second moments and the product of a plane area, transfer theorems

36-37. Computations involving second moments and products of area

38-39. Relation between second moments and products of area, polar moment of area, principal axes

References:

1. Engineering Mechanics–Statics and Dynamics, I. H. Shames, 4th Edition, Prentice Hall of India.
2. Vector Mechanics for Engineers–Statics, F.P. Beer and E.R. Johnston, McGraw Hill Book Co.
3. Engineering Mechanics–Statics, J.L. Meriam and L.G. Kraige, John Wiley & Sons.
4. Engineering Mechanics, S. Timoshenko, D.H. Young, J.V. Rao, Sukumar Pati, 5th Ed, McGraw Hill.
5. Engineering Mechanics – Statics, R. C. Hibbeler, 14th Edition, Pearson Prentice Hall.

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