## PC/CE/31-T STRUCTURAL ANALYSIS-I

| Week | Theory | |
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| | Lecture Day | Topic (Including assignment / Test) |
| 1st | 1. | **Introduction:** Concept of Equilibrium, General Equilibrium equations, concept of free body diagrams, |
| | 2. | Concept of stress and strain, Hooke's law, |
| | 3. | Stress-strain curve of steel and concrete, compound and composite bars, thermal stresses. |
| | 4. | Stress-strain curve of steel and concrete, compound and composite bars, thermal stresses. |
| 2nd | 5. | **Centroid:** Introduction and significance, Centroid of regular shapes |
| | 6. | Symmetrical sections, |
| | 7. | Unsymmetrical sections, hollow sections. |
| | 8. | Unsymmetrical sections, hollow sections. |
| 3rd | 9. | **Moment of Inertia:** Parallel axis theorem, Perpendicular axis theorem, |
| | 10. | Mass moment of inertia, Area moment of inertia of regular shapes: L-sections |
| | 11. | Mass moment of inertia, Area moment of inertia of regular shapes: T-sections, I-sections, |
| | 12. | Mass moment of inertia, Area moment of inertia of regular shapes: T-sections, I-sections, |
| 4th | 13. | Moment of inertia of unsymmetrical sections, hollow sections. |
| | 14. | **Analysis of stresses and strains:-** Analysis of simple states of stresses and strains, Elastic constraints, bending stresses |
| | 15. | Theory of simple bending, Flexure formula, combined stresses in beams, |
| | 16. | Numerical Examples |
| 5th | 17. | Shear stresses, Mohr's circle, Principle stresses and strains |
| | 18. | Torsion in shafts and closed thin walled sections, |
| | 19. | Stresses and strains in cylindrical shells |
| | 20. | Stresses and strains in cylindrical shells: Numerical Examples |
| 6th | 21. | Spheres under internal pressure |
| | 22. | **Bending moment and shear force in determinate beams and frames:** |
| | 23. | Types of loads on beam and frames, classification of beams, |
| | 24. | Numerical Examples |
| **7th** | **25.** | **1st Minor Test** |
| 8th | 26. | shear force and bending moment diagrams: simply supported, subjected to any combination of point loads, uniformly distributed and varying load and moment |
| | 27. | shear force and bending moment diagrams: simply supported, subjected to any combination of point loads, uniformly distributed and varying load and moment |
| | 28. | shear force and bending moment diagrams: overhang beams subjected to any combination of point loads, uniformly distributed and varying load and moment |
| | 29. | overhang beams subjected to uniformly distributed and varying load and moment |
| 9th | 30. | shear force and bending moment diagrams: overhang beams subjected to any combination of point loads, uniformly distributed and varying load and moment |
| | 31. | shear force and bending moment diagrams: cantilever beams subjected to any combination of point loads, uniformly distributed and varying load and moment |
| | 32. | shear force and bending moment diagrams: cantilever beams subjected to any combination of point loads, |
| | 33. | cantilever beams subjected: uniformly distributed and varying load and moment |
| 10th | 34. | Relationship between load, shear force and bending moment. |
| | 35. | **Three hinged arches:** Arch subjected to any combination of point loads, |
| | 36. | uniformly distributed and varying load and moment, |
| | 37. | Horizontal thrust, radial shear force and bending moment diagrams. |
| 11th | 38. | **Deflections in beams:** Introduction |
| | 39. | Slope and deflections in beams by differential equations |
| | 40. | Moment area method, |
| | 41. | Numerical Examples |
| 12th | 42. | Conjugate beam method |
| | 43. | Numerical Examples |
| | 44. | Unit load method, Principle of virtual work |
| | 45. | Maxwell's Law of Reciprocal Deflections |
| 13th | 46. | **Theory of Columns:** Slenderness ratio, End connections, short columns, Euler's critical buckling loads |
| | 47. | Eccentrically loaded short columns. |
| | 48. | Cylinder columns subjected to axial and eccentric loading |
| | 49. | Cylinder columns subjected to axial and eccentric loading |
| 14th | 50. | **2nd Minor test** |
| 15th | 51. | **Analysis of statically determinate trusses:** Introduction, Various types, stability, Analysis of plane trusses by method of joints and method of sections, Examples |
| | 52. | Analysis of space trusses using tension coefficient method. |
| | 53. | Analysis of space trusses using tension coefficient method, Examples |
| | 54. | Analysis of space trusses using tension coefficient method, Examples |