قسم الهندسة المدنية - مواد الامتحان التنافسي للعام الدراسي 2025-2026

الدكتوراه

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ت	المادة الدراسية	الدرجة
.1	خرسانة مسلحة متقدم	15 %
.2	تحليل منشآت متقدم	15 %
.3	ميكانيك تربة متقدم	15 %
.4	هندسة الاساسات المتقدم	15 %
.5	عناصر محددة	10 %
.6	ميكانيك الاجسام الصلبة	10 %
.7	تسرب مياه	10 %
.8	تكنولوجيا الخرسانة متقدم	10 %

Competitive Exam - Post-Graduate (PhD Program) – 2025-2026		
Advanced Reinforced Concrete **Design of Concrete Structure by Arthur H. Nilson**		
Chapter	**Subject**	**Remarks**
CH.7	**Analysis and Design for Torsion** 1- Introduction 2- Torsion in Plain Concrete Members 3- Torsion in Reinforced Concrete Members 4- Torsion Plus Shear 5- ACI Code Provisions for Torsion Design	
CH.8	**Short Columns** 1- Introduction: Axial Compression 2- Lateral Ties and Spirals 3- Compression Plus Bending of Rectangular Columns 4- Strain Compatibility Analysis and Interaction Diagrams 5- Balanced Failure 6- Distributed Reinforcement 7- Unsymmetrical Reinforcement 8- Circular Columns 9- ACI Code Provisions for Column Design 10- Design Aids	
CH.9	**Slender Columns** 1- Introduction 2- Concentrically Loaded Columns 3- Compression Plus Bending 4- ACI Criteria for Slenderness Effects in Columns 5- ACI Criteria for Nonsway vs. Sway Structures 6- ACI Moment Magnifier Method for Nonsway Frames 7- ACI Moment Magnifier Method for Sway Frames	
CH.10	**Strut-and-Tie Models** 1- Introduction 2- Development of Strut-and-Tie Models 3- Strut-and-Tie Design Methodology 4- ACI Provisions for Strut-and-Tie Models & Applications	

Competitive Exam - Post-Graduate (PhD Program) – 2025-2026		
Advanced Structures Analysis **(MATRIX ANALYSIS OF STRUCTURES, By Aslam Kassimali 2nd Edition, 2012)**		
Chapter	**Subject**	**Remarks**
One	**Introduction** - Flexibility and Stiffness Methods - Analytical Models - Fundamental Relationships for Structural Analysis	
Three	**Plane Trusses** - Degrees of Freedom - Member Stiffness Relations in the Global Coordinate System - Structure Stiffness Relations	
Five	**Beams** - Analytical Model - Member Fixed-End Forces Due to Loads - Structure Fixed-Joint Forces and Equivalent Joint Loads	
Six	**Plane Frames** - Analytical Model - Member Stiffness Relations in the Global Coordinate System - Structure Stiffness Relations	
Seven	**Member Releases and Secondary Effects** - Member Releases in Plane Frames and Beams - Support Displacements - Temperature Changes and Fabrication Errors	

Advanced Soil Mechanics

Competitive Exam - Post-Graduate (Ph.D Program) – 2025-2026		
The mechanics of soil an Introduction to critical state line - Atkinson		
Chapter	**Subject**	**Remarks**
Three	**State of Stress and Strain in Soil** - Tow Dimensional State of Stress - Principal stresses and planes - Tow dimensional state of Strain – Plane strain - Principal planes and principal strains - Relationships between state of stress and state of stain	
Four	**Stress and Strain Paths and Invariants** - Stress Plath - Invariant of Stress - Invariant of Strain - Volumetric strain - Stress – strain behaviour of an ideal elastic soil	
Five	**Laboratory soil Testing** - Boundary conditions - Control of loading - Control of pore water pressure - Engineering soil testing	
Nine	`**Shear Testing** - Shear testing Apparatus - Simple tests in triaxial apparatus - Typical test Results	
Eleven	**Behaviour of over consolidated clay** - Drained tests - Hvorslev Surface - Critical state line and boundary surface - The complete state boundary surface	
Twelve	**Behaviour of Sand** - The critical state line for sand - Normalized plot - The effect of dilation and Taylor's model	

Competitive Exam - Post-Graduate (PhD Program) – 2025-2026		
Advanced Foundation Engineering : by V.N.S. Murthy		
Chapter	**Subject**	**Remarks**
Three	Soil Explorations - SPT - CPT - Pressuremeter Test	
Four	Depth of Foundation and Other Considerations	All titles in this chapter are required
Five	Ultimate Bearing Capacity	All titles in this chapter are required
Six	Safe Bearing Pressure and Settlement Calculation	All titles in this chapter are required
Eleven	Drilled Pier Foundations	All titles in this chapter are required

Competitive Exam - Post-Graduate (PhD Program) – 2025-2026		
Finite Element **(First Course in the Finite Element Method, By Daryl L. Logan 6th Edition, 2017)**		
Chapter	**Subject**	**Remarks**
One	**Introduction** - General Steps of the Finite Element Method - Applications of the Finite Element Method - Advantages of the Finite Element Method	
Two	**Introduction to the Stiffness (Displacement) Method** - Definition of the Stiffness Matrix - Derivation of the Stiffness Matrix for a Spring Element - Example of a Spring Assemblage - Assembling the Total Stiffness Matrix by Superposition (Direct Stiffness Method) - Boundary Conditions	
Three	**Development of Truss Equations** - Global Stiffness Matrix for Bar Arbitrarily Oriented in the Plane Truss - Computation of Stress for a Bar in the x – y Plane - Solution of a Plane Truss	
Four	**Development of Beam Equations** - Beam Stiffness - Distributed Loading - Beam Element with Nodal Hinge	
Five	**Frame and Grid Equations** - Two-Dimensional Arbitrarily Oriented Beam Element - Rigid Plane Frame Examples - Grid Equations	
Eight	**Development of the Linear-Strain Triangle Equations** - Derivation of the Linear-Strain Triangular Element Stiffness Matrix and Equations - Example LST Stiffness Determination	

Competitive Exam - Post-Graduate (PhD Program) – 2025-2026		
Mechanic of Solids by James M., Timoshenko		
Chapter	**Subject**	**Remarks**
One	Stresses - Stresses in x, y, and z directions. - Principal stresses.	
Two	Strains - Displacements of a deformed body in x, y, and z directions. - Strains in x, y, and z directions. - Compatibility of strains (Two dimensions). - Principal strains (Two dimensions).	
Three	Stress-strain relations - Generalized hook's law. - Elastic constants. - Plane stress and plane strain problems.	
Four	Two-dimensional problems in elasticity (in x, y-coordinates), (Stress function).	
Five	Two-dimensional problems in elasticity (polar coordinates).	
Seven	Theories of failure of materials under stresses.	

Competitive Exam - Post-Graduate (PhD Program) – 2025-2026		
Seepage **Fundamentals of ground water flow- By Harr**		
Chapter	**Subject**	**Remarks**
One	**One dimensional flow** - Heads - Darcy law - Permeability	
Two	**Two dimensional flow** - Equation for flow in soil (Laplace Eq.) - Methods of solution Laplace Eq. - Dupuit theory	
Three	**Seepage through earth dams**	
Four	**Dewatering** - Confined flow - Unconfined flow	

Competitive Exam - Post-Graduate (Ph.D Program) – 2025-2026		
Advanced concrete Technology- John Newman		
Chapter	**Subject**	**Remarks**
Ch. 1	Introduction of concrete - Concrete Components, special cements, Manufacturing of Portland cement , Composition of Portland Cement	
Ch. 7 & 8	Elastic properties of concrete	
Ch. 12	Hot weather and cold weather concreting	
Ch. 12	Fibrous concrete	
Ch. 10	Non-Destructive Tests of concrete	
Ch. 11	Concrete Mix Design - ACI mix design - BS mix design	
Ch. 9	Concrete subjected to elevated Temperature	