SAP2000 v9 - A'dan Z'ye Adım Adım Eğitim Problemleri

SAP2000 programının çeşitli komutları ve olanaklarını göstermek üzere yirmi altı örnek problem hazırlanmıştır. Problemler sizin bu komutların nasıl ve hangi sırayla kullanıldığını, modelleme sırasında nasıl bir ilişkide olduklarını anlamanızı sağlayacaktır. Aşağıdaki tablo problem ismini, modellenen yapı tipini, modelin hazırlanmasında kullanılan program olanaklarını ve bazı önemli komutları göstermektedir. Komutların listesi, bir komutun nasıl kullanıldığını gösteren örnek probleme ulaşabilmeniz amacıyla hazırlanmıştır.

Problem İsmi - Yapı Tipi	Kullanılan Program Olanakları	Kullanılan Komutlar
A. Beton duvar(perde) ve çelik çerçeve	**Grid Lines** (Grid Çizgileri) **Divide Frames** (Çubukları Böl) **Frame Releases** (Çubuk Uç Serbestlikleri) **Steel Design** (Çelik Boyutlama)	Assign > Area > Automatic Area Mesh Assign > Frame Loads > Point Assign > Frame/Cable/Tendon > Releases/Partial Fixity Assign > Frame/Cable/Tendon > Frame Sections Assign > Frame/Cable/Tendon Loads > Distributed Assign > Joint Loads > Forces Define > Area Sections Define > Combinations Define > Coordinate Systems/Grids Define > Load Cases Define > Materials Design > Steel Frame Design > View/Revise Overwrites Display > Show Forces/Stresses > Joint Draw > Quick Draw Area File > New Model > 2D Frame Template Options > Preferences > Steel Frame Design
B. Beton duvar (perde)	**Groups** (Gruplar) **Section Cuts** (Çoklu Kesit) **Load Combinations** (Yük Kombinezonları) **Linear Replication** (Doğrusal Çoğaltma)	Assign > Assign to Groups Assign > Joint Loads > Forces Define > Area Sections Define > Combinations Define > Load Cases Define > Materials Display > Analysis Results Tables Edit > Replicate - Linear File > New Model - Wall Template
C. Çelik çerçeve	**Diaphragm Constraint** (Diyafram Bağımlılığı) **Design Optimization** (Boyutlama	Assign > Area > Automatic Area Mesh Assign > Area Loads > Uniform (Shell) Assign > Frame/Cable/Tendon > Frame

	Optimizasyonu) **Load Combinations** (Yük Kombinezonları) **Automatic Area Mesh** (Otomatik Alan Bölümlendirme) **Mode Shapes** (Mod Şekilleri) **New Model** (Yeni Model), (Şablon kullanılmadan yeni model oluşturma) **Linear Replication** (Doğrusal Çoğaltma) **Mirror Replication** (Simetrik Çoğaltma) **Radial Replication** (Dairesel Çoğaltma) **Steel Design** (Çelik Boyutlama)	Sections Assign > Joint > Constraints Assign > Joint > Restraints Define > Analysis Cases - Modal Define > Area Sections Define > Coordinate Systems/Grids Define > Frame Sections Define > Load Cases Define > Materials Draw > Draw Frame/Cable/Tendon Draw > Draw Rectangular Area Edit > Divide Frames Edit > Replicate - Linear Edit > Replicate - Mirror Edit > Replicate - Radial File > New Model > Grid Only Options > Preferences > Dimensions/Tolerances Options > Preferences > Steel Frame Design Start Animation
D. Eğimli mesnetler	**Radial Replication** (Dairesel Çoğaltma) **Rotated Support** (Dönmüş Mesnet)	Assign > Frame/Cable/Tendon > Frame Sections Assign > Joint > Local Axes Assign > Joint > Restraints Assign > Joint Loads > Forces Define > Materials Design > Steel Frame Design > Display Design Info Design > Steel Frame Design > Start Design/Check of Structure Design > Steel Frame Design > Verify All Members Passed Design > Steel Frame Design > Verify Analysis vs Design Sections Display > Show Forces/Stresses > Joint Edit > Replicate - Radial File > New Model - Beam Template
E. Çekme Altında Çelik Çubuklar	**Draw Special Joint** (Özel Düğüm Noktası Çiz) **Geometric Nonlinear P-Delta** (Geometrik NonLineer P-Delta) **Move** (Taşıma)	Assign > Joint > Restraints Assign > Joint Loads > Forces Define > Analysis Cases - Nonlinear, P-Delta Define > Frame Sections Define > Load Cases Define > Materials Draw > Draw Frame/Cable/Tendon

		Draw > Draw Special Joint Edit > Move File > New Model - Grid Only template View > Show Grid, None
F. Hidrostatik basınca maruz duvar	**Hydrostatic Loading** (Hidrostatik Yükleme) **Joint Patterns** (Düğüm Noktası Şablonları)	Assign > Area Loads > Surface Pressure (All) Assign > Joint > Restraints Assign > Joint Patterns Define > Coordinate Systems/Grids Define > Joint Patterns Define > Materials File > New Model - Wall Template
G. Mesnet çökmeli çerçeve	**New Model form Teplate** (Şablondan Yeni Model) **Support Displacement** (Mesne Çökmesi)	Assign > Frame/Cable/Tendon > Frame Sections Assign > Joint Loads > Displacements Define > Materials Display > Show Forces/Stresses > Joint File > New Model - Portal Frame Template Options > Preferences > Dimensions/Tolerances
H. Betonarme kiriş	**Concrete Design** (Betonarme Boyutlama) **New Model from Template** (Şablondan Yeni Model)	Assign > Frame/Cable/Tendon > Frame Sections Assign > Frame/Cable/Tendon Loads > Distributed Define > Frame Sections Define > Load Cases Define > Materials Design > Concrete Frame Design > Display Design Info Design > Concrete Frame Design > Select Design Combos Design > Concrete Frame Design > Start Design/ Check of Structure File > New Model - Beam Template
I. Öngerilmeli betonarme kiriş	**Response Combinations** (Yük Tepki Kombinezonları) **Output Stations** (Çıktı Alım Bölgeleri) **Prestressing** (Ön Germe)	Assign > Frame/Cable/Tendon > Output Stations Assign > Frame/Cable/Tendon > Frame Sections Assign > Frame/Cable/Tendon Loads > Distributed Assign > Joint > Springs Define > Combinations Define > Frame Sections Define > Load Cases

		Define > Materials Display > Show Forces/Stresses > Frame/Cable/Tendon Draw > Frame/Cable/Tendons - Tendon
J. Elastik zemine oturan kiriş	**Divide Frames** (Çubukları Böl) **Response Combinations** (Yük Tepki Kombinezonları) **Springs** (Yaylar)	Assign > Frame/Cable/Tendon > Frame Sections Assign > Frame/Cable/Tendon Loads > Temperature Assign > Joint > Masses Assign > Joint Loads > Forces Define > Frame Sections Define > Load Cases Define > Materials Display > Show Forces/Stresses> Frame/Cable/Tendon Edit > Divide Frames File > New Model - Beam Template Options > Preferences > Dimensions/Tolerances
K. Çelik moment çerçevesi	**New Model form Template** (Şablondan Yeni Model) **Steel Design** (Çelik Boyutlama) **Unbraced Length Ratio** (Çaprazla Tutulmamış Boy Oranı)	Assign > Frame/Cable/Tendon > Frame Sections Assign > Frame/Cable/Tendon Loads > Distributed Assign > Joint Loads > Forces Define > Load Cases Define > Materials Design > Steel Frame Design > Start Design/Check of Structure Design > Steel Frame Design > View/Revise Overwrites Display > Show Tables File > New Model - 2D Frames Template
L. Periyodik yükleme	**Mode Shapes** (Mod Şekilleri) **Modal Time History Analysis (Periodic)** (Modal Zaman Alanı Analizi)	Assign > Frame/Cable/Tendon > Frame Sections Assign > Joint Loads > Forces Define > Analysis Cases - Time History, Periodic Define > Frame Sections Define > Functions > Time History Define > Materials Display > Show Plot Functions File > New Model - 2D Frames Template
M. X-Y Düzleminde	**Mesh Area Objects** (Alan Nesnelerini Bölümlerdir) **"Trick (aldatmaca)"** Problemi	Assign > Joint Restraints Assign > Joint Loads > Forces Define > Area Sections

burulmalı düz plak		Define > Coordinate Systems/Grids Define > Materials Display > Show Forces/Stresses > Joint Draw > Draw Rectangular Area Edit > Mesh Areas File > New Model - Grid Only
N. Çerçeve-perde etkileşimi	**Diaphragm Constraint** (Diyafram Bağımlılığı) **Groups** (Gruplar) **Section Cuts** (Çoklu Kesit)	Assign > Area Loads > Uniform (Shell) Assign > Assign to Groups Assign > Frame/Cable/Tendon > Frame Sections Assign > Joint > Constraints Assign > Joint > Restraints Assign > Joint Loads > Forces Define > Analysis Cases - Modal, Nonlinear, Time History Define > Area Sections Define > Frame Sections Define > Materials Define > Section Cuts Display > Show Tables Draw > Quick Draw Area File > New Model - 2D Frames Template Options > Preferences > Dimensions/Tolerances
O. Sismik izolatörlü bina - nonlineer zaman alanı analizi	**Base (Seismic) Isolation** (Sismik İzolatörler) **Diaphragm Constraint** (Diyafram Bağımlılığı) **Ritz Vectors** (Ritz Vektörleri) **Dynamic Analysis** (Dinamik Analiz) **Mode Shapes** (Mod Şekilleri) **Link Elements** (Link Elemanları) **Modal Nonlinear Time History Analysis** (Modal Nonlineer Zaman Alanı Analizi)	Assign > Area > Sections Assign > Frame/Cable/Tendon > Frame Sections Assign > Joint > Constraints Define > Analysis Cases - Buckling Define > Area Sections Define > Functions > Time History Define > Link/Support Properties Define > Load Cases Define > Materials Display > Show Tables Display > Show Plot Functions Draw > Draw 1 Joint Link Draw > Draw Frame/Cable/Tendon Draw > Quick Draw Area Edit > Replicate - Linear File > New Model - 3D Frame
P. Kritik burkulma yükü	**Buckling Analysis** (Burkulma Analizi) **P-Delta**	Assign > Frame/Cable/Tendon Loads > Points Assign > Frame/Cable/Tendon > Automatic Frame Subdivide Assign > Joint > Restraints

		Assign > Joint Loads > Forces Define > Analysis Cases - Nonlinear, P-Delta Define > Frame Sections Define > Load Cases Define > Materials File > New Model - Grid Only Template
Q. Üç çerçeve (normal, sönümlü, sismik izolatörlü)	**Concrete Moment Frame** (Betonarme Moment Çerçevesi) **Create Time History Video** (Zaman Alanında Video Kaydı Oluşturulması) **Dynamic Analysis** (Dinamik Analiz) **Mode Shapes** (Mod Şekilleri) **New Model From Template** (Şablondan Yeni Model) **Link Elements** (Link Elemanları) **Nonlinear Time History Analysis** (Nonlineer Zaman Alanı Analizi)	Assign > Joint > Masses Assign > Joint > Restraints Assign > Joint Loads > Forces Define > Analysis Cases - Modal, Nonlinear, Time History Define > Frame Sections Define > Functions > Time History Define > Link/Support Properties - Damper Define > Link/Support Properties - Rubber Isolator Define > Materials Draw > Draw 1 Joint Link Draw > Draw 2 Joint Link Element Draw > Quick Draw Frame/Cable/Tendon File > Create Video > Multi-Step Animation Video File > New Model - 2D Frames Template Start Animation
R. Hareketli yük katarlı köprü	**Divide Frames** (Çubukları Böl) **Bridge Loads** (Köprü Yükleri) **Output Stations** (Çıktı Alım Bölgeleri)	Assign > Frame/Cable/Tendon > Output Stations Assign > Joint > Restraints Define > Analysis Cases - Moving Load Define > Bridge Loads > Bridge Responses Define > Bridge Loads > Lanes Define > Bridge Loads > Vehicle Classes Define > Bridge Loads > Vehicles Define > Frame Sections Define > Materials Display > Show Forces/Stresses > Frame/Cable/Tendon Display > Show Influence Lines Edit > Divide Frames Edit > Move File > New Model - 2D Frames
	Change Labels (İsim ve Numaraları Değiştir) **Section Cuts** (Çoklu Kesit) **Mesh Area** (Alanları Bölümlendir)	Assign > Assign to Groups Assign > Joint > Restraints Assign > Joint Loads > Forces

S. Gövdesinde boşluk bulunan çelik kirişin sonlu eleman modeli	**New Model** (Yeni Model) , (En baştan, şablon kullanmadan yeni model oluşturma) **Stress Contours For Shells** (Plaklar için Gerilme Konturları)	Define > Area Sections Define > Materials Define > Section Cuts Display > Show Tables Display > Show Forces/Stresses > Shell Draw > Draw Rectangular Area Edit > Change Labels Edit > Mesh Areas Edit > Replicate - Linear File > New Model - Grid Only Template View > Set 2D View View > Set Limits
T. Kubbeli silindirik yapı	**New Model from Template** (Şablondan Yeni Model) **Add to Model from Template** (Şablondan Model Ekle)	Edit > Add to Model from Template File > New Model - Cylinder Template File > New Model - Dome Template
U. Tünel kemer (Tonoz) yapı	**Add to Model from Template** (Şablondan Model Ekle) **Response Combinations** (Yük Tepki Kombinezonları) **New Model from Template** (Şablondan Yeni Model)	Assign > Area Loads > Uniform (Shell) Assign > Joint > Restraints Assign > Area Sections Define > Combinations Define > Load Cases Define > Materials Draw > Draw Quad Area Edit > Add to Model from Template Edit > Mesh Areas Edit > Move Edit > Replicate - Mirror File > New Model - Barrel Shell File > New Model - Wall Template View > Set 2D View View > Set Limits View > Show All View > Show Grid View > Show Selection Only
V. Sıcaklık yüklemesi	**Grid Lines** (Grid Çizgileri) **Temperature Loading** (Sıcaklık Yükü)	Assign > Frame/Cable/Tendon > Frame Sections Assign > Frame/Cable/Tendon Loads > Temperature Assign > Joint > Restraints Define > Coordinate Systems/Grids Define > Load Cases Define > Materials Display > Show Forces/Stresses > Joint File > New Model - 2D Frames Template

W. Trapez yüklü basit kiriş	**Divide Frames** (Çubukları Böl) **Trapezoidal Loads (Distributed Loads)** (Trapez Yükler - Yayılı Yükler)	Assign > Frame/Cable/Tendon > Frame Sections Assign > Frame/Cable/Tendon Loads > Point Assign > Frame/Cable/Tendon Loads > Distributed Define > Load Cases Define > Materials Edit > Divide Frames File > New Model - Beam Template
X. Kafes kirişli köprü	**Divide Frames** (Çubukları Böl) **Grid Lines** (Grid Çizgileri) **Linear Replication** (Doğrusal Çoğaltma) **Steel Design** (Çelik Boyutlama)	Assign > Area Loads > Uniform (Shell) Assign > Frame/Cable/Tendon > Frame Sections Define > Area Sections Define > Coordinate Systems/Grids Define > Frame Sections Define > Load Cases Define > Materials Design > Steel Frame Design > Start Design/Check of Structures Draw > Quick Draw Area Element Draw > Quick Draw Braces Draw > Quick Draw Frame/Cable/Tendon Edit > Divide Frames Edit > Move Edit > Replicate - Linear File > New Model - Vertical Truss Options > Preferences > Steel Frame Design
Y. Tek serbestlik dereceli sistemin davranış spektrumu analizi	**Draw Special Joint** (Özel Düğüm Noktası Çiz) **Dynamic Analysis** (Dinamik Analiz) **Mode Shapes** (Mod Şekilleri) **Response Spectrum Analysis** (Davranış Spektrumu Analizi)	Assign > Joint > Masses Assign > Joint > Springs Define > Analysis Cases - Response Spectrum Define > Functions > Response Spectrum Display > Show Forces/Stresses > Joints Draw > Draw Special Joint File > New Model - Grid Only Template File > New Model - Vertical Truss
Z. Davranış spektrumu analizi	**Diaphragm Constraint** (Diyafram Bağımlılığı) **Dynamic Analysis** (Dinamik Analiz) **Grid Lines** (Grid Çizgileri) **Mesh Areas** (Alanları Bölümlendir) **Mode Shapes** (Mod Şekilleri) **New Model from Template** (Şablondan Yeni Model)	Assign > Frame/Cable/Tendon > Frame Sections Assign > Joint > Constraints Assign > Joint > Masses Assign > Joint > Restraints Define > Analysis Cases - Response Spectrum Define > Area Sections

	Linear Replication (Doğrusal Çoğaltma) **Link Elements** (Link Elemanları) **Response Spectrum Analysis** (Davranış Spektrumu Analizi)	Define > Coordinate Systems/Grids Define > Frame Sections Define > Functions > Response Spectrum Define > Materials Draw > Draw Rectangular Area Draw > Quick Draw Area Element Draw > Quick Draw Frame/Cable/Tendon Edit > Mesh Areas Edit > Replicate - Linear File > New Model - 3D Frame