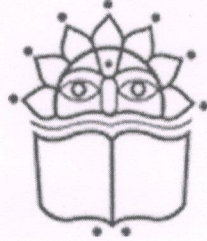


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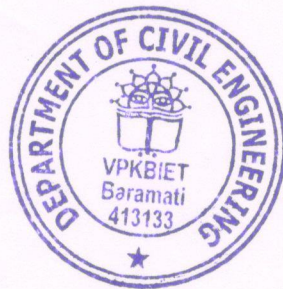
**Syllabus**

**Honors Subjects in Advanced Structural Engineering**

**S.Y. B. Tech. (SEM.-III)**

**Civil Engineering**

**(w.e.f. AY: 2024 - 2025)**



**Syllabus: Honors Subjects in Advanced Structural Engineering w.e.f. AY:2024-25**

**SEMESTER-III**

Course Code	Courses Name	Teaching Scheme (Hrs.)			Examination Scheme and Marks							Credits			
		TH	PR	TU T	Activity	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
CE23281	Engineering Seismology	2	2	-	10	20	50	20	20	-	120	2	1	-	3
<b>Total</b>		<b>2</b>	<b>2</b>	<b>-</b>	<b>10</b>	<b>20</b>	<b>50</b>	<b>20</b>	<b>20</b>	<b>-</b>	<b>120</b>	<b>2</b>	<b>1</b>	<b>-</b>	<b>3</b>

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VPKBIET, Baramati.



**Course Name with Code: Engineering Seismology (CE23281)**

**Teaching Scheme:**  
TH: 2 Hrs./week  
PR: 2 Hrs./week

**Credits**  
3

**Examination Scheme:**  
Activity:10 Marks  
In Semester:20 Marks  
End Semester:50 Marks  
TW:20 Marks  
PR:20 Marks

**Prerequisite:**

**Companion Course, if any: Laboratory Practical**

**Course Objectives:**

1. To get idea about geology and plate tectonics
2. To get the knowledge of the physical properties of mineral and differentiate between the rocks types, their inherent characteristics with Civil Engineering applications.
3. To comprehend Structural geology applied to civil engineering projects
4. Introduce the aspect of earthquakes and vibrations

**Course Outcomes:**

On completion of the course, learner will be able to:

- CO1: Recognize effect of plate tectonics and its significance and utility in civil engineering activities.  
CO2: Exploring the importance of mass wasting processes and various tectonic processes that hampers the design of civil engineering projects and its implications on environment and sustainability.  
CO3: Identify effects of structural geology and their significance and utility in civil engineering activities.  
CO4: Define the concepts of earthquakes, seismology and vibrations.

**Course Contents**

**Unit I: General Geology and Plate Tectonics**

**(6 Hours)**

- a) Introduction to the subject and scope. General Geology: The Earth as a planet, Interior & General composition of the Earth, The rock cycle.  
b) Introduction to plate tectonics and Mountain building activity.

**Unit II: Mineralogy and Petrology**

**(6Hours)**

- a) Introduction to mineralogy: Physical Properties of Minerals, Classification of Minerals, silicate and non-silicate minerals, Rock forming minerals.  
b) Introduction to petrology and Broad classification of rocks.

Igneous Petrology: Plutonic, Hypabyssal and Volcanic rocks, Structures, Textures and Classification of Igneous rocks. Study of common rock types prescribed in practical work and their engineering applications.

Secondary Petrology: Rock weathering, Sedimentary Structures, lithification and digenesis Process, Genetic classification of secondary rocks and grain size classification and Textures, Study of common rock types prescribed in practical work and their civil engineering applications.

Metamorphic Petrology: Agents, Types of metamorphism, Texture and structures. Study of common rock types prescribed in practical work and their civil engineering applications.



### Unit III: Structural Geology

(6 Hours)

- a) Structural Geology: Out crop, dip and strike, conformable series, unconformity, its types and overlap, faults and their types, folds and their types, inliers and outlier. Civil engineering importance of faults and folds with examples.
- b) Structures of rocks: Igneous intrusions and their types, joints and their types, stratification and lamination.

### Unit IV: Earthquake and Seismology

(6 Hours)

Causes of earthquakes, seismic waves, magnitude and intensity of earthquakes, seismographs, accelerometers, ground motion parameters, peak acceleration, peak velocity, peak displacement, ground motion spectra.

#### Books & Other Resources:

##### Text books:

1. A Text Book of Engineering Geology by N. Chenna Kesavulu. 2010, McMillan India Ltd.
2. Text Book of Engineering Geology by R.B. Gupte, 2001, P.V.G. Publications, Pune.
3. Structural Dynamics: Theory and Computation, Mario Paz & William Leigh, Springer Publications

##### Reference books:

1. Kramer, S.L., "Geotechnical Earthquake Engineering", Second Indian reprint, Pearson Education.
2. Geology P. K. Mukerjee, World Press
3. Engineering Geology by F. G. H Blyth and De Frietus, Reed Elsevier India
4. Engineering Geology, Parbin Singh
5. Dynamics of Structures, A. K. Chopra, Pearson Education India.

#### Laboratory Experiments/Assignments

1. **Megascopic identification of following mineral specimens (around 50).**  
Rock Forming Minerals, Economic Minerals and Ore Minerals such as:  
**Silica group:** Rock Crystal, Rosy Quartz, Transparent Quartz, Milky Quartz, Smoky Quartz, Amethyst, Chalcedony, different varieties of Agate, Jasper Banded Hematite Jasper  
**Feldspar group:** Orthoclase, Microcline, Plagioclase  
**Mica group:** Muscovite, Biotite  
**Olivine group:** Olivine Pyroxene group: Augite, Diopside, Hypersthene,  
**Amphibole group:** Hornblende, Asbestos,  
**Zeolite and other group:** Apophyllite, Stilbite, different varieties of Calcite, Gypsum Tourmaline, Chromite, Limonite, Laterite, Kyanite, Graphite, Hematite, Micaceous Haematite, Pyrite, Garnet etc.
2. **Megascopic identification of following different rock specimens. (Around 50).**
  - a) **Igneous Petrology:** Plutonic, Hypabyssal, Volcanic Rocks and their varieties like Granites, Syenite, Pegmatite, Graphic Granite, Dolerite, Andesite, Diorite, Gabbro, Rhyolite, Pumice, Trachyte, All varieties of Basalt like Compact, Giant Phenocryst Basalt (GPB), Amygdaloidal, Pipe A.B, Volcanic Breccia, Tachylytes, Tuff breccia.
  - b) **Sedimentary Rocks:** Rudaceous, Areaceous, Argillaceous, Chemical and Organic Deposits: Laterite, Bauxite, Conglomerates, Secondary Breccia, varieties of Sandstones (Red), Grit, Arkose sandstone, Sandstone with Ripple marks, Sandstone (Current Bedding), Shahabad Limestone, Black Limestone (Cudappah), Stalactite Limestone, Oolitic limestone, Shelly Limestone, Mudstone, Shale (White), Shale (Yellow), Shale (Black).
  - c) **Metamorphic Petrology:** Contact Metamorphic rocks, Dynamothermal Metamorphic rocks:



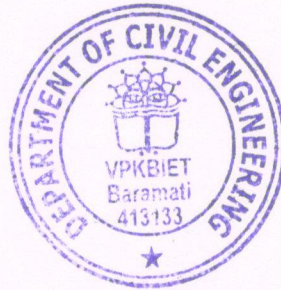
Quartzite's, Marbles, Phyllite, Slate, varieties of Schists (Mica Schist, Biotite Schist with Garnet, Muscovite Schist, Chlorite Schist, Hornblende Schist, Chlorite Schist, Talc Schist, Quartz Sericite Schist), varieties of Gniesses (Augen Gneiss, Hornblende Biotite Gneiss, Hornblende Gneiss), Khondalite, Charnockite, Amphibolite.

3. **Interpretation and construction of geological sections from contoured geological maps** (A. G. Series—IV Total 8 maps and 2 maps to be constructed by the faculty members). Solution of engineering geological problems such as alignment of dams, tunnels, roads, canals, bridges, etc. based on geological maps.

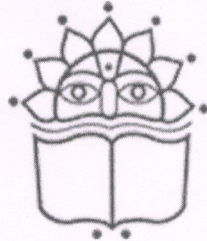
#### 4. Site Visit

#### Activity:

1. Identify the minerals and rocks based on their inherent properties and write a report.
2. Write a report on engineering significance of faults and folds
3. Study and interpretation of any Geological map (Individual or group activity)



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**Faculty of Science and Technology**

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**Syllabus**

**Honors Subjects in Advanced Structural Engineering**

**S.Y. B. Tech. (SEM.-IV)**

**Civil Engineering**

**(w.e.f. AY: 2024 - 2025)**



**Syllabus: Honors Subjects in Advanced Structural Engineering w.e.f. AY:2024-25**

**SEMESTER-IV**

Course Code	Courses Name	Teaching Scheme (Hrs.)			Examination Scheme and Marks							Credits			
		TH	PR	TU T	Activity	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
CE23291	Advanced mechanics of structures	2	2	-	20	20	50	20	20	-	130	2	1	-	3
<b>Total</b>		<b>2</b>	<b>2</b>	<b>-</b>	<b>20</b>	<b>20</b>	<b>50</b>	<b>20</b>	<b>20</b>	<b>-</b>	<b>130</b>	<b>2</b>	<b>1</b>	<b>-</b>	<b>3</b>

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**Course Name with Code: Advanced Mechanics of Structure (CE23291)**

**Teaching Scheme:**  
TH: 2 Hrs./week  
PR: 2 Hrs./week

**Credits**  
03

**Examination Scheme:**  
Activity:10 Marks  
In Semester:20 Marks  
End Semester:50 Marks  
TW:20 Marks  
PR:20 Marks

**Prerequisite:**

1. Fundamentals of Engineering Mechanics, Mechanics of Structure.

**Companion Course, if any: Laboratory Practical**

**Course Objectives:**

1. To know the concept of arch with influence line diagram.
2. To study and analyse plane frames using approximate analysis.
3. To apply concepts of bending in the structure.
4. To analyse effect of stresses on various shapes of beams.

**Course Outcomes:**

After successful completion of the course, students will be able to:

1. Understand the concept of arch and influence line diagram.
2. Implement application of approximate analysis on plane frame.
3. Apply the concept of bending in the structure.
4. Analyse stresses on various shapes of beams.

**Course Contents**

**Unit I: Arches:**

**(6 Hours)**

Introduction to Arches, Analysis of three hinged and semicircular arches-Three Hinge Parabolic Arch Subjected to UDL over Entire Span, Three Hinge Semi-circular Arch Subjected to UDL over Entire Span, Temperature Effect on Three Hinged Arches, Influence lines for Arches-ILD for Horizontal Thrust, ILD for Bending Moment, ILD for Radial Shear

**Unit II: Approximate methods of analysis of building**

**(6 Hours)**

Portal frame method- analysis of building frames subjected to vertical and lateral loads, Analysis of tall and slender frame by Cantilever method

**Unit III: Unsymmetrical Bending:**

**(6 Hours)**

Definition of Shear Center in Bending - Symmetrical and Nonsymmetrical Bending – Bending Stresses in Beams Subjected to Nonsymmetrical Bending - Deflections of Straight, Beams Subjected to Nonsymmetrical Bending





#### Unit IV: Advanced Analysis of Beams:

(6 Hours)

Curved Beams: Circumferential Stresses in a Curved Beam - Radial Stresses in Curved Beams - Correction of Circumferential Stresses in Curved Beams Having I-, T-, or Similar Cross Sections.

#### Books & Other Resources:

##### Text books:

1. R. C. Hibbeler, "Structural Analysis", Pearson Education Publication
2. Pandit and Gupta (1999), "Theory of Structures", Vol. I, Tata McGraw Hill Publication
3. Gere and Weaver (1998), "Matrix Analysis of Framed Structures", CBS Publication Delhi, 2nd Edition

##### Reference books:

4. Wilbur and Norris, "Elementary Structural Analysis", Tata McGraw Hill Publication.
5. C. K. Wang (1983), "Intermediate structural analysis", Tata McGraw Hill Publication.
6. Pandit and Gupta (1997), "Structural analysis: A matrix approach", Tata McGraw Hill Publication.
7. C. S. Reddy (1996), "Basic structural analysis", Tata McGraw Hill Publication, 2nd Edition
8. Structural Analysis by Devdas Menon, Narosa Publishing Housing Pvt Ltd.
9. Indeterminate Structural Analysis by K U. Muttu, IK International Publishing House Pvt.ltd
10. Matrix Analysis of Frames structures by William Weaver J.R and James M.Gere, CBS publications.

#### Practical:

1. Analyses portal frame.
2. Analyses Curve beam.
3. Analyses three hinged arches.
4. Analyses three hinged arches using commercial software.
5. Write down Six assignments (includes Minimum 6 questions from each unit).

#### Activity:

1. Visit to the traditional Arch site and write a detailed report.
2. Visit to any Advance Structure and Write a detailed report.
3. Mini Project on Analyses of Arch/ Curve Beam/ Portal Frame using any Software.

