



Solapur University Solapur

List of Self Learning- Technical courses, at Third Year Civil Engineering (Semester-VI)

The student will opt for any one of the following courses

- 1) Geosynthetics and Reinforced Soil Structures
- 2) Pavement Analysis and Design
- 3) Planning for Sustainable Development
- 4) TQM and MIS in Civil Engineering
- 5) Earthquake Resistant Non Engineered Construction





T.E. (CIVIL ENGINEERING) PART- II
Geosynthetics and Reinforced Soil Structures
(Self Learning Technical Course)

Examination Scheme:

Theory paper: 50 marks

(Duration 2 Hours)

Unit 1:

Introduction: Historical background of reinforced soil, Principles of reinforced soil through Mohr circle analysis.

Different types of geosynthetics: Types of geosynthetics like geotextiles, geogrids, geonets, geocells, geo-composites, their manufacturing methods.

Unit 2:

Testing methods for geosynthetics: Techniques for testing of different index properties, strength properties, Apparent Opening Size, In-plane and cross-plane permeability tests, assessment of construction induced damage, extrapolation of long term strength properties from short term tests.

Unit 3:

Reinforced Soil retaining walls: Different types of walls like wrap-around walls, full-height panel walls, discrete-facing panel walls, modular block walls Design methods as per BS-8006 and FHWA methods Construction methods for reinforced soil retaining walls.

Reinforced soil slopes: Basal reinforcement for construction on soft clay soils, construction of steep slopes with reinforcement layers on competent soils, Different slope stability analysis methods like planar wedge method, bi-linear wedge method, circular slip methods.

Unit 4:

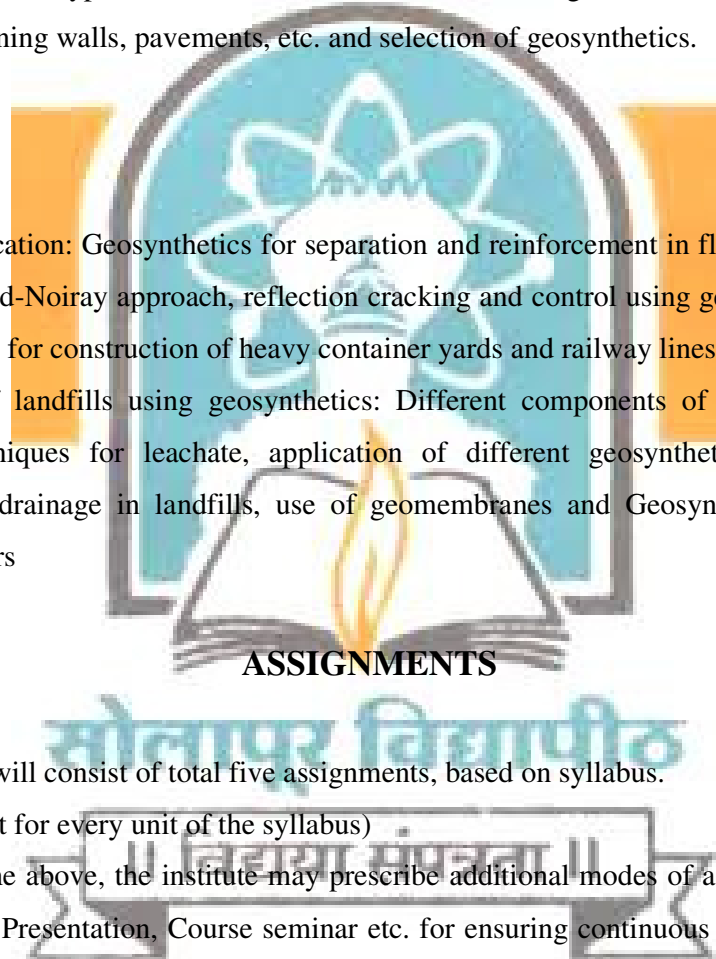
Erosion control on slopes using geosynthetics. Applications in foundations: Binquet and Lee's approach for analysis of foundations with reinforcement layers.

Drainage and filtration applications of geosynthetics: Different filtration requirements, filtration in different types of soils and criteria for selection of geotextiles, estimation of flow of water in retaining walls, pavements, etc. and selection of geosynthetics.

Unit 5:

Pavement application: Geosynthetics for separation and reinforcement in flexible pavements, design by Giroud-Noiray approach, reflection cracking and control using geosynthetics. Use of geosynthetics for construction of heavy container yards and railway lines.

Construction of landfills using geosynthetics: Different components of modern landfills, collection techniques for leachate, application of different geosynthetics like geonets, geotextiles for drainage in landfills, use of geomembranes and Geosynthetic Clay Liner (GCL) as barriers



The term work will consist of total five assignments, based on syllabus.

(One assignment for every unit of the syllabus)

In addition to the above, the institute may prescribe additional modes of assessment such as Unit test, Quiz, Presentation, Course seminar etc. for ensuring continuous assessment of the students.

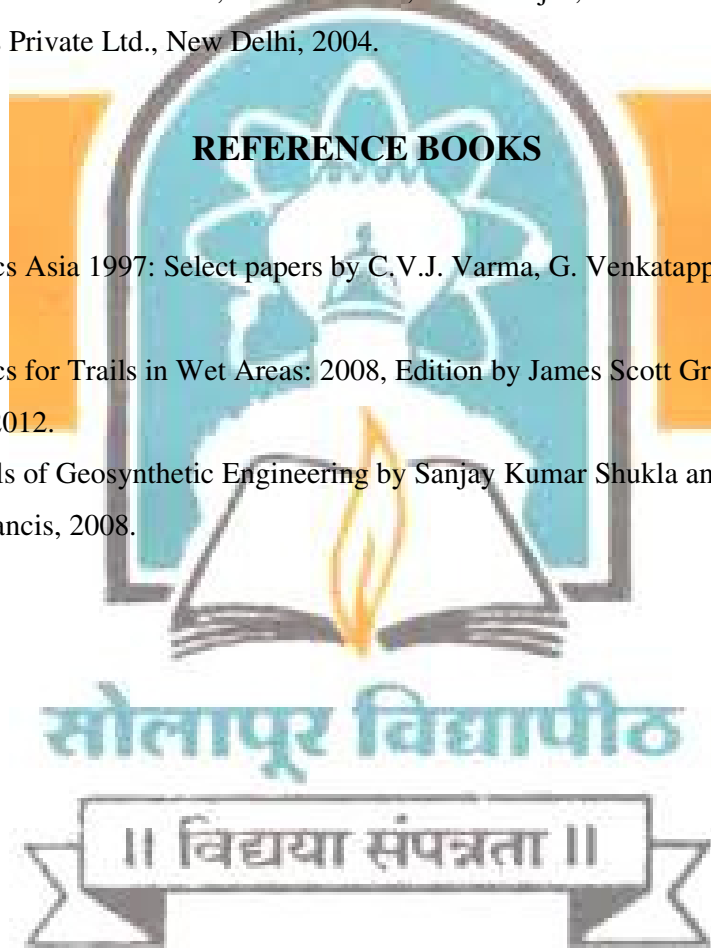
Note: Term will be granted only on satisfactory completion of assignments during stipulated period. The student will be detained in case of non-completion/non-submission of the term work.

TEXT BOOKS

1. Koerner, R.M. "Designing with Geosynthetics", Prentice Hall, New Jersey, USA, 4th edition, 1999.
2. Jewell, R.A., "Soil Reinforcement with Geotextiles", Special Publication No. 123, CIRIA, Thomas Telford. London, UK, 1996.
3. Geosynthetics - New Horizons, Eds. G.V. Rao, PK Banerjee, J.T. Shahu, G.V. Ramana, Asian Books Private Ltd., New Delhi, 2004.

REFERENCE BOOKS

1. Geosynthetics Asia 1997: Select papers by C.V.J. Varma, G. Venkatappa Rao and A.R.G. Rao ,1998.
2. Geosynthetics for Trails in Wet Areas: 2008, Edition by James Scott Groenier , BibliGov Publishers, 2012.
3. Fundamentals of Geosynthetic Engineering by Sanjay Kumar Shukla and Jian-Hua Yin, Taylor & Francis, 2008.





T.E. (CIVIL ENGINEERING) PART- II

Pavement Analysis and Design

(Self Learning Technical Course)

Examination Scheme:

Theory paper: 50 marks

(Duration 2 Hours)

Unit 1:

Types of pavement – Factors affecting design of pavements – wheel loads –ESWL Concept- tyre pressure – contact pressure, Material characteristics – Environmental and other factors.

Unit 2:

Stresses in flexible pavement – layered systems concept – one layer system – Boussinesq Two layer system – Burmister Theory for Pavement Design.
Stresses in rigid pavements – relative stiffness of slab, modulus of sub-grade reaction – stresses due to warping, stresses due to loads, stresses due to friction.

Unit 3:

Pavement design: CBR Method of Flexible Pavement Design- IRC method of flexible pavement design.- AASHO Method of Flexible Pavement design
IRC method of Rigid pavement design – Importance of Joints in Rigid Pavements- Types of Joints – Use of Tie Bars and Dowell Bars.

Unit 4:

Highway Materials – Soil, Aggregate and Bitumen- Tests on aggregates – Aggregate Properties and their Importance- Tests on Bitumen – Bituminous Concrete- Requirements of

Design Mix- Marshall's Method of Bituminous Mix design.

Highway construction – Construction of Earth Roads- Gravel Roads – WBM Roads- Bituminous Pavements- Cement Concrete Roads- Steps in Construction- Reinforced Concrete Pavements – Soil Stabilization – Methods and Objectives- Soil-cement Stabilization and Soil-lime stabilization.

Unit 5:

Need for Highway Maintenance- Pavement Failures- Failures in Flexible Pavements-Types and Causes-Rigid Pavement Failures- Types and causes- Pavement Evaluation- Benkleman Beam method- Strengthening of Existing Pavements- Overlays.

ASSIGNMENTS

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TEXT BOOKS

1. Highway Engineering – S. K. Khanna & C.J. Justo, Nemchand & Bros., 7th Edition (2000).
2. Principles and Practices of Highway Engineering – Dr. L. R. Kadiyali & Dr. N. B. Lal – Khanna Publishers – (2003).

REFERENCE BOOKS

1. Principles of pavement design – Yoder & Wit Zorac – Jhon Willey & Sons.
2. CODES: IRC Code for flexible pavement – IRC – 37 -2001. v2. IRC Code for Rigid pavement – IRC – 58 – 2002.
3. Pavement Analysis and Design by Yang H. Huang (2008), Prentice Hall Publications.
4. Analytical Pavement Design Based on Method of Equivalent Thickness by Monower Sadique Ceng, LAP LAMBERT Academic Publishing.





T.E. (CIVIL ENGINEERING) PART- II
Planning for Sustainable Development
(Self Learning Technical Course)

Examination Scheme:

Theory paper: 50 marks
(Duration 2 Hours)

Unit 1:

Sustainable Development-explains and critically evaluates the concept of sustainable development, Environmental degradation and poverty Sustainable development: its main principles, the evolution of ideas about sustainability, strategies for promoting sustainable development, resistances to the concept, and some alternative approaches. Examine some important current issues and areas of debate in relation to sustainable development.

Unit 2:

Innovation for sustainable development- Environmental management and innovation strategies.

Unit 3:

Societal transformations. Institutional theory.

Unit 4:

Governance for sustainable development. Policy responses to environmental degradation.

Unit 5:

Capacity development for innovation. Research methods.

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TEXT BOOKS

1. Harris, J.M. (2004) Basic Principles for Sustainable Development, Global Development and Environment Institute, working paper 00-04. Available at:
http://ase.tufts.edu/gdae/publications/Working_Papers/Sustainable%20Development.PDF
2. Robinson, J. (2004) Squaring the circle? Some thoughts on the idea of sustainable development Ecological Economics 48(4): 369-384.
3. Hjorth, P. and A. Bagheri (2006) Navigating towards Sustainable Development: A System Dynamics Approach, Futures 38: 74-92.

REFERENCE BOOKS

1. Mog, J.M. (2004) „Struggling with Sustainability – A Comparative Framework for Evaluating Sustainable Development Programs“, World Development 32(12): 2139–2160. IISD commentary on the OECD's Draft Principles for International Investor Participation in Infrastructure (PDF – 68 kb)
2. Arundel, A., R. Kemp, and S. Parto (2004) Indicators for Environmental Innovation: What and How to Measure, forthcoming in International Handbook on Environment and Technology Management (ETM), edited by D. Annandale, J. Phillimore and D. Marinova, Cheltenham, Edward Elgar.
3. Douthwaite, B. (2002) Enabling Innovation. A practical guide to understanding and fostering innovation, London



T.E. (CIVIL ENGINEERING) PART- II
TQM AND MIS IN CIVIL ENGINEERING
(Self Learning Technical Course)

Examination Scheme:

Theory paper: 50 marks

(Duration 2 Hours)

Unit 1:

Quality – various definitions and interpretation. Importance of quality in construction. Factors affecting good quality of construction. Importance of quality on a project in the context of global challenges.

Unit 2:

- Difference between, quality control, quality assurance, total quality control and total quality management (TQM)
- Process based approach for achieving TQM. Study of ISO 9001 principles
- Quality manual – Importance, contents, documentation. Importance of check-lists in achieving quality. Typical checklist for concreting activity, formwork activity, steel reinforcement activity.

Unit 3:

TQM – Necessity, advantages. Six sigma as a tool in TQM. Supply chain management as a tool in TQM. Benchmarking in TQM. Kaizen in TQM. Defects in construction and measures to prevent rectify defects.

Unit 4:

Introduction to Management Information systems (MIS)

Overview, Definition. MIS and decision support systems, Information resources, management subsystems of MIS.

Management information system structure based on management activity whether for operational control, management control or strategic planning.

Unit 5:

- a) Survey of information systems technology w. r. t hardware, software, communications technology, data processing, Information processing.
- b) Concepts of information, planning and control, Information based support systems. Development of an MIS for a construction organization associated with building works.



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TEXT BOOKS

1. Total Engineering Quality Management – Sunil Sharma – Macmillan India Ltd.
2. Quality Control and Total Quality Management by P. L. Jain- Tata McGraw Hill Publ. Company Ltd.
3. Total Project Management – The Indian Context - P. K. Joy Macmillan India Ltd.

REFERENCE BOOKS

1. Management –Principal, process and practices by Bhat – Oxford University Press.
2. Financial management by Shrivastava- Oxford University Press
3. Management Information Systems – Gordon B. Davis, Margrethe H. Olson – Tata McGraw Hill Publ. Co.





T.E. (CIVIL ENGINEERING) PART- II
Earthquake Resistant Non Engineered Construction
(Self Learning Technical Course)

Examination Scheme:

Theory paper: 50 marks

(Duration 2 Hours)

Unit 1:

Introduction: General effects of an earthquake, terminology, structure of earth, earthquake effects. Ground shaking effect on structures: Inertia forces, seismic load, factors affecting seismic load, nature of seismic stresses, important parameters in seismic design, Factors affecting damage, building configuration, opening size, rigidity distribution, ductility, foundation, construction quality.

Unit 2:

General concepts of earthquake resistant design: categories of building, seismic zones, importance of building, bearing capacity of foundation soil, combination of parameters. Planning of building, choice of site, structural design, fire resistance, structural framing, requirements of structural safety.

Unit 3:

Buildings in bricks and other masonry units: Introduction, Typical damage and failure of masonry buildings: Non- structural damage, Damage and failure of bearing walls, Failure of ground, failure of roofs and floors, Causes of damage in masonry buildings, Typical strengths of masonry, General construction aspects, Horizontal reinforcement in walls, Vertical reinforcement in walls.

Unit 4:

Stone buildings: Introduction, Typical damage and failure of stone buildings, Typical structural properties, General construction aspects: overall dimensions, mortar, openings in walls, masonry bond, horizontal reinforcing of walls, and vertical reinforcing of walls.

Unit 5:

Restoration and strengthening of buildings: Introduction, Techniques to restore original strength, Planner modifications and strengthening of walls: Inserting new walls, strengthening existing walls, external binding, and other points.

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TEXT BOOKS

1. Elements of Earthquake Engineering- Jai Krishna, South Asian Pub. New Delhi.
2. Earthquake Resistant, Design of Masonry and Timber Structures – A.S. Arya.

REFERENCE BOOKS

1. Manual of Earthquake Resistant Non engineering Construction, University of Roorkee.
2. Earthquake Tips published by NICEE, IIT Roorkee.
3. Government of Maharashtra Earthquake resistant Design of house guiding lines and assessment of damages.
4. IS – 4326:1993 Earthquake resistant design and construction of buildings