GUJARAT TECHNOLOGICAL UNIVERSITY

BRANCH NAME: Civil (Structure Engineering)
SUBJECT NAME: Advanced Concrete Design of structures
SUBJECT CODE:3712012
1st Semester

Type of course: Core course

Prerequisite: Elementary design of concrete structures and Concrete Technology

Rationale: Reinforced cement concrete is one of the widely used construction material. With rapid development of infrastructure facilities, large number of special structures like bunker and silos, flat slabs, grid floors, shear walls, corbels, deep beams, water retaining structures etc. are being designed and constructed across the globe. The course on *Advanced Concrete Design acquaints* the structural engineering students to analyze and design such special structures as per Indian Standard code of practice.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Name of Topic	Teaching Hours	% Weightage
1	Design philosophy, Loads and load combinations, Material Characteristics	02	05
2	Serviceability criteria: Deflection and crack width.	03	10
3	Design of slender columns	02	05
4	Strut-and- Tie Method, Design of Deep Beam and Corbel	04	10
5	Proportioning, analysis and design of flat slab by direct design method and detailing	04	10
6	Analysis and design of Grid floors by Rankine Grashoff Method, classical equivalent plate theory and IS:456 method.	05	10
7	Design of rafts, Strip footing and pile cap.	08	15
8	Design of Intz type shaft supported water tank	06	15

9	Design of Bunker and Silos	04	10
10	Design of Shear Walls, Compression Field Theory for Shear Design, Design against Torsion	04	10

Reference Books:

1. Advanced Design of Concrete Structures – Krishana Raju N., Tata Mc-Graw Hill, Delhi.
2. Reinforced Concrete Design – Sinha S. N., Tata Mc-Graw Hill, Delhi.
3. Limit State Design of Reinforced Concrete – Jain A. K., Nemchand & Bros., Roorkee.
4. Advanced Reinforced Concrete, Varghese A. V., Prentice Hall of India.
5. Reinforced concrete, Vol - I and II – Shah H. J., Charotar Pub., Anand.
6. Design of Multi-storied Building (G+3) - Shah and Karve, Structure Pub., Pune.
7. Reinforced Concrete Design, Pillai S. U. and MenonD., Tata McGraw-Hill, 3rd Ed, 1999.
8. Reinforced Concrete Structures, Park R.and PaulayT. , John Wiley & Sons, 1995.
9. Advanced Reinforced Concrete Design, Varghese P. C., Prentice Hall of India, New Delhi.
10. Unified Theory of Concrete Structures, Hsu T. T. C. and Mo Y. L., John Wiley & Sons, 2010.
11. IS Codes : IS:456, IS:875, IS:1893, IS:4326, IS:13920, IS: 3370, IS: 4995 (I & II), SP:16, SP:34.

Course Outcome:

After learning the course the students should be able to:

a) Carry out load calculation, analysis, design and detailing of Slender Column, Corbel, Deep beams, flat slabs, water tanks, bunker and silos, Shear Walls as per relevant IS code of practice.,
b) Analysis and design of raft foundation, strip footing and pile caps,
c) Ensure serviceability criteria for reinforced concrete structural elements.

List of Experiments/Tutorials:

At least two design suitably selected from topics of the course. The report shall consist of full analytical treatment, design procedure, references and all necessary drawings in the form of neat dimensioned sketches.

List of Open Source Software/learning website:

http://nptel.ac.in/