SARVAJANIK UNIVERSITY
SarvajanikCollege of Engineering and Technology
Master of Technology
Structural Engineering

M.Tech.I Semester I

Subject Name: Advanced Design of Concrete Structures **Subject Code:** MTST13102

Type of course: Core-II
Prerequisite: Basics concrete design, Concrete Technology
Rationale: The civil engineering structures are made up of Reinforced Cement Concrete. Knowledge of designing and detailing of reinforced concrete structures is very important for civil engineers in order to make structures safe, serviceable and durable during its life span. Also 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. This course will provide detailed knowledge of design and reinforcement detailing of special structures as per Indian standards.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	150
3	0	2	4	60	25	15	30	20	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1.	Limit state of deflection and Cracking.	3	5%
2.	Analysis and Design of Slender columns.	5	10%
3.	Introduction of Strut & Tie approach, Design of corbel by strut&tie approach, Design of deep beam using IS Code provisions.	4	10%
4.	Design and detailing of Flat slab by direct design method.	6	12%
5.	Analysis and design of Grid floors by Rankine Grashoff Method, classical equivalent plate theory and IS:456 methods.	6	15%
6.	Analysis and Design of Pile cap by truss theory and beam theory.	5	10%
7.	Analysis and Design of Intz type shaft supported water tank.	6	13%
8.	**Bunkers and Silos:** Introduction, Type of bunkers and silos, Analysis and design of bunkers and silos.	6	15%
9.	**Shear walls:** Introduction, Forces acting on shear walls, type of shear walls, arrangement of shear walls in building, Design considerations of shear walls, Analysis and design of shear walls.	4	10%

Suggested Specification table with Marks (Theory/Practical):

% Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	**15**	**25**	**25**	**20**	**5**

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **E:** Evaluate **C:** Create and above Levels **(Revised Bloom's Taxonomy)**

Note: This specification table shall be treated as a general guideline for students andteachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Text Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1	Advanced Design of Concrete Structures	Krishana Raju N.	CBS Publication ISBN-10 : 9788123929606 ISBN-13 : 978-8123929606	2016	3rd
2	Limit State Design of Reinforced Concrete	B.C.Punamia, Ashok Kumar Jain, Arun Kumar Jain	Laxmi Publications ISBN-10 : 9788131802410 ISBN-13 : 978-8131802410	2016	Revised Edition
3	Reinforced concrete, Vol - I and II	Shah H. J.	Charotar Pub., Anand. ISBN-9789385039188 ISBN-9788192869223	Vol.1- 2016 Vol.2-2014	11th 7th
4	Reinforced Concrete Design,	Pillai S. U. and MenonD.	Tata McGraw-Hill, ISBN-10 : 007014110X ISBN-13 : 978-0070141100	2017	3rd
5	Advanced Reinforced Concrete Design,	Varghese P. C	Prentice Hall of India, New Delhi. ISBN-10 : 812032787X ISBN-13 : 978-8120327870	2005	2nd
6	Limit state Design of Reinforced Concrete	Varghese P. C	Prentice Hall of India, New Delhi. ISBN-10 : 8120320395 ISBN-13 : 978-8120320390	2008	2nd
7	Fundamentals of Reinforced Concrete	Sinha. N. C. and Roy S. K	S. Chand and Company Limited, New Delhi, ISBN-10 : 8121901278 ISBN-13 : 978-8121901277	2007	1st
8	Reinforced Concrete Design	Sinha S N,	Tata Mc Graw Hill Publication ISBN-10 : 9351342476 ISBN-13 : 978-9351342472	2017	3rd

9	Reinforced Concrete: Limit State Design	Jain A K	NEM CHAND & BROTHERS-ROORKEE ISBN-10 : 9788185240664 ISBN-13 : 978-8185240664	2012	7th
10	Advanced RCC Design (Vol. II)	S.S. Bhavikatti:	New Age Publishers, New Delhi ISBN-10 : 8122440525 ISBN-13 : 978-8122440522	2016	3rd
11	Design of Reinforced Concrete Structures	Gambhir.M. L	Prentice Hall of India ISBN-10 : 8120331931 ISBN-13 : 978-8120331938	2008	1st

IS Codes : IS:456-2000, IS:875, IS:4326, IS:13920, IS: 3370, IS: 4995 (I & II), SP:16, SP:34.

Course Outcome:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks weightage
CO-1	Understand and ensure the serviceability criteria of reinforced concrete structural elements. *(R,U, E,….cognitive level)*	5%
CO-2	Analyze, design and detailing slender columns, Flat slab as per relevant IS code of practice. *(R,U,A,N,E ….cognitive level)*	22%
CO-3	Analyze, design and detailing Grid floor slab and Shear walls as per relevant IS code of practice. *(R,U,A,N,E ….cognitive level)*	25%
CO-4	Analyze, design and detailing corbels by strut-tie approach, deep beam and Pile cap by truss theory and beam theory.*(R,U,A,N,E,C….cognitive level)*	20%
CO-5	Analyze, design and detailing storage structures like water tanks, bunkers, silos as per relevant IS code of practice.*(R,U,A,N,E ….cognitive level)*	28%

LIST OF PRACTICALS:

Tutorials shall consist of at least two design problems from each topic. The detailed drawings in the form of neat dimensioned sketches shall be carried out from at least three topics.

List of Open Source/learning website:

- https://nptel.ac.in/content/storage2/courses/105105104/pdf/m7l17.pdf
  - Limit state of serviceability
- https://nptel.ac.in/content/storage2/courses/105105104/pdf/m10l27.pdf
  - Design of slender columns
- https://nptel.ac.in/courses/105/105/105105105/
  - Design of slender columns
  - Deflection of RC beams