Semester	**:**	**V**		
Course No.	**:**	**FS-354**	**Credit Hrs.** **:**	**2(1+1)**
Course Title	**:**	**Strength of Materials**		

SYLLABUS

Objectives : To make the students acquainted with the importance of strength parameters of different materials and the techniques to calculate unknown forces in 2D structures.

THEORY

Introduction to strength of materials; Slope and deflection of beams: slope and deflection of beams using integration techniques, Moment area theorems and conjugate beam method, Problems of slope and deflection; Theory of columns and struts, Problems of columns and struts; Steel connections: analysis of rivet connections and welded connections; Stability analysis of masonry dam and problems on masonry dam; Statically indeterminate structures – analysis of propped beams, fixed beams and continuous beams using superimposition and three moment equation; Analysis of beams using moment distribution method and solving related problems.

PRACTICAL

To determine the quality of check of two different aggregates through impact test; To perform the tensile test of steel specimen - to observe the behaviour of materials under load - to calculate the value of e-ultimate stress, permissible stress, percentage elongation etc. and to study its fracture; To prepare mortar specimen of different cement, demoulding of the specimen next day for compression and tension test after 2^{nd} and 4^{th} week; To prepare concrete specimen to perform the compression, bending test and to measure elasticity - concrete cylinders, cubes and beams to test after 2^{nd} and 4^{th} week; To perform compression and tension test on mortar specimen prepared 2 weeks before; To perform compression and bending test of the concrete specimen prepared 2 weeks before; To perform compression and tension test on mortar specimen prepared 4 weeks before; To perform compression and bending test of the concrete specimen prepared 4 weeks before; To determine Young's modulus of elasticity of beam with the help of deflection produced at centre due to loads placed at centre and quarter points; To perform Brinell's hardness tests on a given specimen; To study the behavior of materials under torsion and to evaluate various elastic constants; To study load deflection and other physical properties of closely coiled helical spring in tension and compression; To write detail report emphasizing engineering importance of performing tension, compression, bending, torsion, impact and hardness tests on the materials.

TEACHING SCHEDULE

THEORY [FS-354]

Lecture No.	Topic	Sub-topics/ Key Points	Weightage (%)
1	Introduction	Introduction to strength of materials	25
2 - 4	Slope and Deflection of Beams	Slope and deflection of beams: Slope and deflection of beams using integration techniques, Moment area theorems and conjugate beam method, Problems on slope and deflection	
5 - 6	Columns and Struts	Theory of columns and struts, Problems on columns and struts	20
7 - 9	Steel Connections	Analysis of rivet connections and welded connections	25
10 - 11	Stability Analysis of Masonry Dam	Stability analysis of masonry dam and problems on masonry dam	
12 - 14	Statically Indeterminate Structures	Statically indeterminate structures – Analysis of propped beams, fixed beams and continuous beams using superimposition and three moment equation	30
15 - 16	Analysis of Beams	Analysis of beams using moment distribution method and solving related problems	
		Total =	**100**

TEACHING SCHEDULE

PRACTICAL [FS-354]

Exercise No.	Exercise Title
1	To determine the quality of check of two different aggregates through impact test.
2	To perform the tensile test of steel specimen.
3	To prepare mortar specimen of different cement, demolding for compression and tension test after 2nd week.
4	To prepare mortar specimen of different cement, demolding for compression and tension test 4th week.
5	To prepare concrete specimen to perform the compression, bending test and to measure elasticity - concrete cylinders, cubes and beams to test after 2nd week
6	To prepare concrete specimen to perform the compression, bending test and to measure elasticity - concrete cylinders, cubes and beams to test 4th week.
7	To perform compression and tension test on mortar specimen prepared 2 weeks before.
8	To perform compression and bending test of the concrete specimen prepared 2 weeks before.
9	To perform compression and tension test on mortar specimen prepared 4 weeks before.
10	To perform compression and bending test of the concrete specimen prepared 4 weeks before.
11	To determine Young's modulus of elasticity of beam with the help of deflection produced at center due to loads placed at center and quarter points.
12	To perform Brinell's hardness tests on a given specimen.
13	To study the behaviour of materials under torsion and to evaluate various elastic constants.
14	To study load deflection and other physical properties of closely coiled helical spring in tension.
15	To study load deflection and other physical properties of closely coiled helical spring in compression.
16	To write detail report emphasizing engineering importance of performing tension, compression, bending, torsion, impact and hardness tests on the materials.

Suggested Readings [FS-354]:

1. Junarkar S.B., 2001. Mechanics of Structures (Vol-I). Choratar Publishing House, Anand.
2. Khurmi R.S., 2006. Strength of Materials. S. Chand Publishing, New Delhi.
3. Lehri R.S. and Leheri R.S., 2006. Strength of Materials. S.K. Kataria and Sons, New Delhi.
4. Ramamrutham S. and Narayanan R., 2003. Strength of Materials. Dhanpat Rai and Sons, Nai Sarak, New Delhi.
5. Vazirani V.N., Ratawani M.M. and Duggal S.K. 2012. Analysis of Structures. Khanna Publ., New Delhi.