B.E. Semester: VI

Department of Civil Engineering

Subject Name: Advance Analysis of Structures (CV606-N-A)

Course Category: Program Course Elective (PCE)

A.   Objectives of the Course:

➢   The aim of this subject is to understand the behaviour of the structures through advanced matrix methods, which are used in all the popular computer software

➢   Different type structures like frame, truss, and grids are analyzed using Matrix methods (stiffness method and flexibility method)

➢   The course also covers analysis of special structures like domes and beams curved in plan, arches, cables and suspension bridges.

➢   Course also includes introduction to analysis software available in market

B.   Teaching & Evaluation Scheme:

Teaching Scheme				Credit	Evaluation Scheme					Total Marks
					Theory		IE	CIA	Pra/Viva	
L hrs	T hrs	P hrs	Total Hrs		Hrs	Marks	Marks	Marks	Marks	
3	1	0	4	4	3	70	30	20	30	150

C.   Detailed Syllabus:

1.   Matrix Flexibility Method:

Analysis of Indeterminate Beams, Plane Frames, Plane Truss, Grid

2.   Matrix Stiffness Method:

Analysis of Indeterminate Beams, Plane Frames, Plane Truss, Grid

3.   Domes:

Uses of Domes, Types of Domes, Nature of Stresses in Spherical and Conical Domes, Analysis of Spherical and Conical Domes Subjected to UDL and Point Load at Crown

4.   Beams Curved in Plan:

Uses of Curved Beams, Types of Internal Forces, Analysis of Curved Beam Fixed at Ends for Point Load and UDL, Analysis of Circular Beams for Symmetrical UDL

5. **Arches, Cables and Suspension Bridges:**

Calculation of Internal Forces in Three Hinge Arches with Circular and Parabolic Shapes Subjected to Various Types of Loading, Forces and End Reactions in Cables due to Various Types of Loading, Un Stiffened Three Hinged Parabolic and Cantenory Type Suspension Bridges

D. **Lesson Planning:**

Unit No	Title of the Unit	Minimum Hours	Weightage (%)
1	Matrix Flexibility Method	10	25
2	Matrix Stiffness Method	10	25
3	Domes	07	15
4	Beams Curved in Plan	08	15
5	Arches, Cables and Suspension Bridges	10	20
	Total:	**45**	**100**

E. **List of Practical/Assignments:**

➤ Minimum 10 examples from each unit

Note:

➤ Students will have to submit the term work in one spiral bound of A4 Blank Pages

F. **Instructional method and pedagogy (Continuous Internal Assessment Scheme CIA):**

➤ At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.

➤ Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.

➤ Attendance is compulsory in lectures, practical and tutorial which carry 05 marks.

➤ At regular intervals assignments is given. In all, a student should submit all assignments of 05 marks each.

➤ Classroom participation and involvement in solving the problems in tutorial rooms carries 05 marks.

➢ Viva voce will be conducted at the end of the semester of 05 marks.

➢ One internal exam of 30 marks is conducted as a part of mid semester evaluation

G.   Students Learning Outcomes:

On the successful completion of this course

➢ The students will be able to understand the fundamentals of structure and various Methods of analysis

➢ The students will be able to determine the effects of loads on physical structures and their components

➢ The course gives students an understanding of the importance of structural analysis and the tools available to determine the response of a structural system to external loads

H.   Recommended Study Materials:

a.   Text book & Reference Books:

1.   Junarkar, S.B. and Shah, H.J., Mechanics of Structures Vol. I, Charotar Publishing House

2.   Negi, L.S. and Jangid, R.S., Structural Analysis, Tata McGraw Hill

3.   Reddy, C.S., Basic Structural Analysis, Tata McGraw Hill

4.   Structures By Danial L. Schodek and Martin Bechthold, PHI Publication

5.   Gere and Timoshenko, Mechanics of Materials, CBS Publishers

6.   Hibbler, R.C., Mechanics of Materials, Pearson Education

7.   Wang, C.K., Intermediate Structural Analysis, Tata McGraw Hill 50

8.   Structural Analysis by Devdas Menon, Narosa, Publication

9.   Advanced Structural Analysis by Devdas Menon, Narosa Publication

10.   Matrix Analysis of Framed Structure by James M. Gere and William Weaver Published by Springer

b.   Web Materials:

1.   http://www.nptel.iitm.ac.in/courses.php?branch=Civil

2.   http://www.nptel.iitm.ac.in/video.php?courseId=1053

3.   http://www.nptel.iitm.ac.in/courses/Webcoursecontents/IITDelhi/Mechanics%20Of% 2

4. Solids/index.htm

5. http://www.nptel.iitm.ac.in/video.php?courseId=1069