

Academic Course Description

<p style="margin: 0;">BHARATH UNIVERSITY Faculty of Engineering and Technology Department of Civil Engineering</p> <p style="margin: 0;">BCE 404 BASIC STRUCTURAL DESIGN Fourth Semester, 2016-17 (Even Semester)</p>

Course (catalog) description

The purpose of this course is to introduce the students to limit state design of structural steel members subjected to compressive, tensile and bending loads, including connections along with Design of structural systems such as roof trusses, purlins as per provisions of current code (IS 800 - 2007) of practice.

Compulsory/Elective course : Compulsory for Civil students

Credit / Contact hours : 4 credits / 60 hour

Course Coordinator : Ms. A. Arunya, Assistant Professor

Instructors :

Name of the instructor	Class handling	Office location	Office phone	Email (domain: @bharathuniv.ac.in)	Consultation
Ms.A.Arunya	Second year Civil	Civil Block			9.00 - 9.50 AM
Ms.R.J.Rinu Isah	Second year Civil	Civil Block			1.30 – 2.20 PM

Relationship to other courses:

Pre –requisites : BEE103 Basic Mechanical Engineering

Assumed knowledge : Basic knowledge in Instrumentation handling

Following courses : BCE703 Design of steel structures

Syllabus Contents

UNIT I MASONRY

12

Strength of bricks and masonry – Design of walls – Pillars and roofing as per the latest BIS codes. Timber Structures – Properties and strength of timber used in constructions – permissible stresses in timber – design of joints, using bolts, and metal connections – design of tension and compression members – beams in bending.

UNIT II STEEL STRUCTURES

12

Introduction – properties of Indian standard rolled steel sections – types of loads, permissible stresses in tension, compression and shear as per BIS Code - Riveted and Bolted connections – Permissible stresses for various types of rivets and bolts -Efficiency of a joint - types of failures of riveted Joint - design of riveted and bolted connections for members subjected to axial forces - design of eccentrically loaded connections.

UNIT III TENSION MEMBERS

12

Design of simple and compound steel sections subjected to tension- tension splice-Compression Members - Maximum slenderness ratio for different types of compression members – Design of simple and compound sections to resist compressive loads – design of battens and lacing – design of column base and connections – column splicings.

UNIT IV BEAMS

12

Design of simple beams- strength and stiffness criteria – design of built up beams – curtailment of flange plates – connections between flange and web- need for lateral support for compression flange and their design – web strength of beams in shear – design of grillage foundation

UNIT V ROOF TRUSSES

12

Types of roof trusses for different spans - design of pitched roof trusses for dead, live and wind loads - Design of joints, Design of supports and bearings – design of purlins.

TEXT BOOKS:

1. Ramachandra S. Design of steel Structures, Vol I & II, Standard Publications, New Delhi 1982

REFERENCE:

1. Arya.A.S. & Ajmani. IL "Design of Steel Structures". Nem Chand Bros., Roorkee (UP), 1992
2. Dayaratnam.P, “Design of Steel Structures”, Wheelers Publishing Co.Ltd, 2008
3. Duggal, Design of Steel Structures, Tata McGrew Hill Co.II Edition,1991
4. Vazirani V.N. and Ratwani M.M. : Steel Structures , Khanna Publications, New Delhi,1976

Note: The relevant BIS Codes for the design of masonry (I.S.1905) Timber (LS883) and Steel Structures (IS 800) are permitted in the University Examinations. Steel Tables are also permitted in the University Examinations

Computer usage: Nil

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Broad area:

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	February 1 st week	Session 1 to 14	2 Periods
2	Cycle Test-2	March 2 nd week	Session 15 to 28	2 Periods
3	Model Test	April 2 nd week	Session 1 to 45	3 Hrs
4	University Examination	TBA	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

	Correlates to program outcome		
	H	M	L
1. To study about different materials used in masonry	c	d	a
2. To analyse the steel structures.	c	d	a
3. To design of trusses and their members.	c	d	a
4. To carry out the analysis of simple beams	c	d	a
5. To study about different loading conditions on trusses	c	d	a

Draft Lecture Schedule

S.NO	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I MASONRY			
1.	Introduction		T1/R3
2.	Strength of bricks and masonry	YES	
3.	Design of walls	YES	
4.	Pillars and roofing as per the latest BIS codes	YES	
5.	Timber Structures	YES	
6.	Properties and strength of timber used in constructions	YES	
7.	Defects in timber		
8.	permissible stresses in timber	YES	
9.	design of joints, using bolts, and metal connections	YES	
10.	design of tension and compression members	YES	
11.	beams in bending	YES	
12.	problems		
UNIT II STEEL STRUCTURES			
13.	Introduction	YES	T1/R3
14.	properties of Indian standard rolled steel sections	YES	
15.	types of loads, permissible stresses in tension	YES	
16.	compression and shear as per BIS Code	YES	
17.	Types of connections		
18.	Riveted and Bolted connections	YES	
19.	Permissible stresses for various types of rivets and bolts	YES	
20.	Efficiency of a joint	YES	
21.	problems		
22.	types of failures of riveted Joint	YES	
23.	Detailed explanations		
24.	design of riveted and bolted connections for members subjected to axial forces	YES	
25.	design of eccentrically loaded connections	YES	
26.	problems		
UNIT III TENSION MEMBERS			
27.	Introduction		T1/R3
28.	Design of simple and compound steel sections subjected to tension	YES	
29.	Maximum slenderness ratio	YES	
30.	for different types of compression members		
31.	Design of simple to resist compressive loads	YES	
32.	Detailed explanations		
33.	Design of simple sections		
34.	Design of compound sections		
35.	design of battens	YES	
36.	design of lacings		
37.	problems		
38.	design of column base	YES	
39.	design of connections		
40.	problems		
41.	column splicings	YES	
UNIT IV BEAMS			
42.	Introduction		T1/R3
43.	Design of simple beams	YES	
44.	strength and stiffness criteria	YES	
45.	design of built up beams	YES	
46.	curtailment of flange plates	YES	

47.	connections between flange and web	YES	
48.	need for lateral support for compression flange	YES	
49.	Design procedures		
50.	web strength of beams in shear	YES	
51.	design of grillage foundation	YES	
UNIT V ROOF TRUSSES			
52.	Introduction		T1/R3
53.	Types of roof trusses for different spans	YES	
54.	design of pitched roof trusses for dead, live and wind loads	YES	
55.	Applications & probs		
56.	Design of joints	YES	
57.	Applications & probs		
58.	Design of supports and bearings	YES	
59.	Applications & probs		
60.	Design of purlins.	YES	

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.

Evaluation Strategies

Cycle Test – I	-	5%
Cycle Test – II	-	5%
Model Test	-	5%
Assignment	-	5%
Attendance	-	10%
Final exam	-	70%

Prepared by: Ms. A.Arunya, Assistant Professor, Department of Civil

Dated :

ABET Outcomes expected of graduates of B.Tech / Civil/ program by the time that they graduate:

- a. An ability to apply knowledge of mathematics, science, and engineering
- b. An ability to design and conduct experiments, as well as to analyze and interpret data
- c. An ability to design a hardware and software system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d. An ability to function on multidisciplinary teams
- e. An ability to identify, formulate, and solve engineering problems
- f. An understanding of professional and ethical responsibility
- g. An ability to communicate effectively
- h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- i. A recognition of the need for, and an ability to engage in life-long learning
- j. A knowledge of contemporary issues
- k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Educational Objectives

PEO1: PREPARATION

Civil Engineering graduates will have knowledge to apply the fundamental principles for a successful profession and/or for higher education in Civil Engineering based on mathematical, scientific and engineering principles, to solve realistic and field problems that arise in engineering and non engineering sectors

PEO2: CORE COMPETENCE

Civil Engineering graduates will adapt to the modern engineering tools and construction methods for planning, design, execution and maintenance of works with sustainable development in their profession.

PEO3: PROFESSIONALISM

Civil Engineering Graduates will exhibit professionalism, ethical attitude, communication and managerial skills, successful team work in various private and government organizations both at the national and international level in their profession and adapt to current trends with lifelong learning.

PEO4: SKILL

Civil Engineering graduates will be trained for developing soft skills such as proficiency in many languages, technical communication, verbal, logical, analytical, comprehension, team building, inter personal relationship, group discussion and leadership skill to become a better professional.

PEO5: ETHICS

Civil Engineering graduates will be installed with ethical feeling, encouraged to make decisions that are safe and environmentally-responsible and also innovative for societal improvement.

Course Teacher	Signature
Ms. Arunya. A	
Ms.R.J.Rinu Isah	

Course Coordinator

HOD/Civil