SYLLABUS

OF

M. TECH
(Structural Engineering)
II YEAR

(CBCS)

DEPARTMENT OF CIVIL ENGINEERING

INTEGRAL UNIVERSITY
LUCKNOW

SYLLYBI AND EVALUATION SCHEME

M.Tech. (Structural Engineering)

(w.e.f. 2020-21)

Semester – III

S. No.	Course Category	Code No	Name of Subject	Periods			Credits	Evaluation Scheme				Subject Total
				L	T	P	C	Continuous Assessment (CA)			Exam ESE	
								UE	TA	Total		
1	DE		Elective –II	3	1	-	4	40	20	60	40	100
2	DE		Elective –III	3	1	-	4	40	20	60	40	100
3	DE		Elective –IV	3	1	-	4	40	20	60	40	100
4	DC	CE616	Directed Study	-	-	-	4	-	-	-	100	100
5	DC	CE699	M.Tech Dissertation	-	-	-	4	-	-	60	40	100
Total							**20**					**500**

Semester – IV

S. No.	Course Category	Code No	Name of Subject	Periods			Credits	Evaluation Scheme				Subject Total
				L	T	P	C	Continuous Assessment (CA)			EXAM ESE	
								UE	TA	Total		
1	DC	CE699	M.Tech Dissertation	-	-	-	4	-	-	60	40	100
2	DC	CE699	M.Tech Dissertation	-	-	-	4	-	-	60	40	100
3	DC	CE699	M.Tech Dissertation	-	-	-	4	-	-	60	40	100
4	DC	CE699	M.Tech Dissertation	-	-	-	4	-	-	60	40	100
Total							**16**					**400**

TA- Teacher Assessment; **ESE –** End Semester Examination; **CT-** Cumulative Test.
Note: Duration of ESE shall be 03 (Three) hours per subject

M. Tech (Structural Engineering)

List of the Elective Paper:

Elective – I

CE504	Concrete Technology
CE505	Design of foundation structures
CE506	Design of steel Concrete composite Structures
CE513	Theory of Plates and Shell

Elective – II

CE601	Design of Bridges
CE602	Stability of Structures
CE603	Maintenance and Rehabilitation of Structures

Elective – III

CE607	Industrial Structures
CE608	Prefabricated Structures
CE612	Computer Aided Design in Structural Engineering

Elective – IV

CE606	Design of Tall Buildings
CE611	A Seismic Design of Structures
CE613	Prestressed Concrete

TA- Teacher Assessment; ESE – End Semester Examination; CT- Cumulative Test.
Note : Duration of ESE shall be 03 (Three) hours per subject.

Integral University, Lucknow

Effective from Session: 2015-16							
Course Code	CE601	**Title of the Course**	Design of Bridges	**L**	**T**	**P**	**C**
Year	2nd	**Semester**	3rd	3	1	0	4
Pre-Requisite	NIL	**Co-requisite**	NIL				
Course Objectives	• To gain knowledge of basic of hydraulics as well as structural design consideration of short span bridge. • To design of RCC and steel bridges. • Impart knowledge of relevant bridge foundation and its design.						

Course Outcomes	
CO1	Lerner is made aware about selection criteria of type of bridge and various geometric & hydraulics design considerations as well as IRC loadings.
CO2	Lerner will be able to design reinforced and prestressed concrete bridges.
CO3	Lerner will be able to design steel bridges.
CO4	Learner will be made aware with seismic consideration in bridge design use of bearing in bridge design.
CO5	Learner will be able to design bridge foundation.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	Introduction to Bridges	Introduction and selection of type of bridges, Geometric and Hydraulic design considerations, Catchment characteristics, Analysis of Runoff Response, runoff concentration, concentration time, economical span, Afflux, Loading and standards for highway and railway bridges, IRC class A, class B, class AA and 70R loadings.	08hrs	CO1
2	Reinforced and Pre-stressed Concrete Girders	Introduction of Reinforced and Pre-stressed Concrete Bridges: types and standard forms, Balanced cantilever Bridge, Arch bridges, types of arch bridges, Balance cantilever bridges design, Bowstring girder bridges.	08hrs	CO2
3	Steel Bridges	Steel bridges, Plate Girder Bridge, Web flanges, intermediate stiffeners, Vertical stiffeners, end bearing stiffeners, Box girder bridge, elements and design, Cable Stayed Bridge, Cantilever bridge.	08hrs	CO3
4	Design of Pier & Abutment	Design of pier and abutments; Force on bearings, types of bearing and design, Seismic design considerations.	08hrs	CO4
5	Bridge Foundations	Design and Analysis of deep foundation, pile foundation, group of piles efficiency and well foundation.	08hrs	CO5

Reference Books:

C.Vilmaz, S.Wasti Cetin Vlmaz, Analysis and Design of Bridges, CBC Press, (2014).

Raju Krishna, Design of Bridges, Oxford &Ibh Publishing Co. Pvt Ltd (2012).

D. Jhonson Victor, Design of Bridges, Oxford & IBH, (2012).

M.A Jayram, Design of Bridge Structures, PHI,(2012).

e-Learning Source:

https://nptel.ac.in/courses/105105165/

https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/105105165/lec10.pdf

https://lecturenotes.in/m/19545-note-of-bridge-engineering?reading=true

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)													
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	2	1	0	1	0	0	0	0	1	1	0	0
CO2	2	1	3	1	1	1	1	0	0	1	1	1	0	0
CO3	2	1	3	1	1	1	1	0	0	1	1	1	0	0
CO4	3	1	2	1	1	1	1	1	0	0	0	1	0	0
CO5	2	1	3	0	1	1	1	0	0	0	0	1		

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session: 2016-17							
Course Code	CE608	**Title of the Course**	Prefabricated Structures	**L**	**T**	**P**	**C**
Year	2nd	**Semester**	3rd	3	1	0	4
Pre-Requisite	NIL	**Co-requisite**	NIL				
Course Objectives	• To get knowledge about various prefabrication systems and structural schemes. • To know about design consideration, Economy of prefabrication and prefabrication of load bearing members. • To design the Pre-stressed concrete sections. • To design for shear, torsion, bend and bearing and application of prestressing of roof members. • To learn about production, Transportation and erection of Form-work and dimension tolerances of shuttering and mould design.						

Course Outcomes	
CO1	One will get knowledge about various prefabrication systems and structural schemes.
CO2	Learner will learn about design consideration, Economy of prefabrication and prefabrication of load bearing members.
CO3	Learner will be able to design the Pre-stressed concrete section.
CO4	Learner will learn about application of prestressing of roof members and able to design for shear, torsion, bend and bearing.
CO5	Learner will learn about production, Transportation and erection of Formwork and dimension tolerances of shuttering and mould design.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	Introduction to Prefabrication	Need of prefabricated structural, Its aim, advantages & disadvantages, types of prefabrication, Material used of Prefabrication.	08hrs	CO1
2	Modular Co-ordination in Prefabricated Structures	Modular co-ordination, components, prefabrication systems and structural schemes, Design considerations, Economy of prefabrication: prefabrication of load bearing members.	08hrs	CO2
3	Design of Prestressed Concrete Sections	Disuniting of structures; Design of cross section of load carrying members; structural behavior of precast structures, Handling and erection stresses, Design of section for flexure, Axial tension, Compression.	08hrs	CO3
4	Design for Shear, Torsion, Bend and Bearing	Application of prestressing of roof members; floor systems, Two-way load bearing walls, wall panels, hipped plate and shell structures, Dimensioning and detailing of joints for different structural connections; constriction and expansion joints.	08hrs	CO4
5	Fabrication and Erection of Formwork	Production, Transportation and Erection; Organization of production, Storing and erection equipments, Shuttering and Mould design-Dimensional tolerances, Erection of RCC structures, Total prefabricated buildings.	08hrs	CO5

Reference Books:

Jain A.K., "Reinforced concrete design, limit state Method", Nem Chand & Bros.; Seventh edition (2012)

Punmia B.C and Jain A.K, "Reinforced concrete structures(Vol.2)", Laxmi Publications, Fifth Edition (2003)

Praveen Nagarjan, "Prestessed concrete design" Pearson Education New Delni(2013)

Garold (Gary) Oberlender and Robert Peurifoy "Formwork for Concrete Structures" McGraw Hill Professional,(2010)

IS 456-2000 Indian Standard "Plain & Reinforced Concrete-code of practice", BIS, New Delhi

IS 159166-2010 Building Design and Erection using Prefabricated Concrete -code of practice", BIS, New Delhi

e-Learning Source:

https://civildigital.com/prefabricated-structures-prefabrication-concept-components-advantages-ppt/

https://www.srividyaengg.ac.in/coursematerial/Civil/103823.pdf

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)													
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	1	0	0	0	0	0	0	2	0	0
CO2	3	2	2	1	1	0	0	0	0	0	0	2	0	0
CO3	2	2	3	1	1	0	0	0	0	0	0	2	0	0
CO4	3	2	3	2	1	0	0	0	0	0	0	2	0	0
CO5	3	3	2	1	2	0	0	0	0	0	0	2	0	0

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session: 2020-21							
Course Code	CE613	**Title of the Course**	Prestressed Concrete	**L**	**T**	**P**	**C**
Year	2nd	**Semester**	3rd	3	1	0	4
Pre-Requisite	Nil	**Co-requisite**	Nil				
Course Objectives	• To impart concepts of pre-stressing in concrete and their types. • To impart importance's of control deflection. • To impart behavior and design concept of pre-stressed concrete flexure members. • To impart concept of shear, bond and bearing stress in prestress concrete member. • To impart concept and behavior of full and partial prestressed members						

Course Outcomes	
CO1	Learner should know the concepts of pre-stressing in concrete structures as well an able to formulate losses in prestressed concrete.
CO2	Learner should know the factors influencing deflection in prestress structures and able to calculate deflection of prestressed concrete member by using code provision for given conditions.
CO3	Learner will be able to understand behavior of prestressed flexure members and able to design flexure member by using code provision for given conditions.
CO4	Learner will be able to understand concepts of transmission length, bond, bearing and shear stress in prestressed members as well as able to design of prestress member for bond, bearing and shear forgiven requirement.
CO5	Learner will be able to understand the behavior and design concept of full and partial prestressed members and able to design member for given requirements by following the guideline of Indian codes.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	Introduction to Prestressed Concrete	Pre-stressed concrete, basic concept, prestressing material and prestressing systems; losses of prestress, End anchorage and cable layouts.	08hrs	CO1
2	Deflection of Prestressed Concrete Member	Importance of control of deflection, Factor influencing deflection, Deflection of cracked and uncracked member	08hrs	CO1
3	Design of Flexural Member	Flexure strength of prestressed concrete sections, Design of section for flexure, analysis and design of prestressed concrete flexure members, simply supported beams and slabs	08hrs	CO1
4	Design for Shear, Torsion, Bend and Bearing	Shear and principle stress in prestress concrete member, design of shear reinforce ment, transmission length, design of prestress member for bond and bearing	08hrs	CO1
5	Design of Tension and Compression Member	Analysis and design of prestressed compression and tension concrete members. Design of partial pre-stress pre tensioned poles, design of pre-stressed concrete piles.	08hrs	CO1

Reference Books:

Jain A.K., "Reinforced concrete design, limit state Method", Nem Chand & Bros.; Seventh edition (2012)

N Krishna Raju. "Prestressed Concrete" McGraw Hill Education; Fifth Edition (2012)

Praveen Nagarjan, "Prestessed concrete design" Pearson Education New Delni(2013)

IS 456-2000 Indian Standard "Plain & Reinforced Concrete-code of practice", BIS, New Delhi

e-Learning Source:

https://www.nptel.ac.in/courses/105106117/
https://www.nptelvideos.in/2012/11/prestressed-concrete-structures.html

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)													
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	0	0	0	0	0	0	0	0	0	0	1	3
CO2	2	2	0	0	0	0	0	2	0	0	0	1	1	3
CO3	2	2	2	0	0	0	0	2	0	1	0	1	1	3
CO4	2	2	2	0	0	0	0	2	0	1	0	1	1	3
CO5	2	2	2	0	0	0	0	2	0	1	0	1	1	3

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session: 2016-17							
Course Code	CE616	**Title of the Course**	Directed Study	**L**	**T**	**P**	**C**
Year	2nd	**Semester**	3rd	0	0	0	4
Pre-Requisite	NIL	**Co-requisite**	NIL				
Course Objectives	• To make learner aware about the latest technology and engineering practices in industries.						

Course Outcomes	
CO1	Awareness regarding the latest technology, engineering methodology and practices being used in industries.

Unit No.	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	Undergo industrial training in any respective industry in order to get familiar with the latest technology, engineering techniques and practices being used in the industry. Have to absorb some skill from the training identifying the area of improvement. The concepts/skills must be clearly understood and presented by the student. A hard copy of the report should be submitted to the Department after the completion of directed study.	03hrs	CO1 and CO2

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)													
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	0	0	0	3	3	3	0	0	3	3	0	3	3	3

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session: 2019-20							
Course Code	CE699	**Title of the Course**	M. Tech Dissertation	**L**	**T**	**P**	**C**
Year	2nd	**Semester**	4th	**0**	**0**	**0**	**4**
Pre-Requisite	NIL	**Co-requisite**	NIL				
Course Objectives	To enhance the writing skill for research paper and dissertation						

Course Outcomes	
CO1	Capability to work independently on a research-based problem
CO2	Skill to perform review of available literature effectively to present research gap.
CO3	Aptitude to plan methodology for the attainment of various research objectives.
CO4	Competency to apply of various engineering and technological tools to carry research.
CO5	Ability to conclude work using critical thinking
CO6	Proficiency in preparing presentation and report.

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)													
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	0	0	0	3	3	0	0	3	3	3	0	3	0	2
CO2	0	0	0	3	3	0	0	3	3	3	0	3	0	1
CO3	0	0	0	0	3	0	0	0	3	3	0	3	0	2
CO4	0	0	0	3	3	0	0	0	3	0	0	3	0	1
CO5	0	0	0	3	3	0	0	3	3	3	0	3	0	1
CO6	0	0	0	0	3	0	0	3	3	3	0	3	0	1

1- Low Correlatio0n; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**