PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

PROGRAM SCHEME

SEMESTER - I

MODULE CODE	SUB-CATEGORY	MODULE	L	T	P	C	Internal Marks	External Marks	Total
CIVL5101	PC	STRUCTURAL DYNAMICS	4	0	0	4	50	100	150
CIVL5102	PC	THEORY OF PLATES AND SHELLS	4	0	0	4	50	100	150
CIVL5103	PC	ADVANCED CONCRETE STRUCTURES	4	0	0	4	50	100	150
CIVL5104	PC	MATERIAL TECHNOLOGY	3	0	0	3	25	75	100
CIVL5105	PC	MATERIAL TECHNOLOGY LAB	0	0	2	1	25	25	50
CIVL5106	SP	SPECIAL PROBLEM	0	0	2	1	25	25	50
	GE	ELECTIVE-A*	4	0	0	4	50	100	150
TOTAL CREDITS			**19**	**0**	**4**	**21**	**275**	**525**	**800**

L = Lecture
T = Tutorial
P = Practical
C = Credit Point

ELECTIVES

MODULE CODE	GENERIC ELECTIVE - A*
SAPA0320	SAP (ABAP)ψ
SAPM0321	SAP (MM)ψ
SAPS0322	SAP (SD)ψ
SAPF0323	SAP (FI)ψ
SAPP0324	SAP (HR)ψ
CCNA0325	CCNA ψ
MATH0302	Numerical analysis and optimization

ψAdditional fee, if any, shall be borne by the student.

PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER - I

Structural Dynamics

L	T	P
4	0	0

MODULE CODE	CIVL5101
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will consist of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B & C comprise of short answer type and long answer type questions. These sections will have internal choice.

OBJECTIVES:

1. To impart the knowledge for analysis of structures subjected to dynamic loading.
2. To apply basic methods employed for analysis of civil engineering problems involving dynamics and earthquake.
3. To study the basic principles of free and forced vibration (both undamped and damped) of single degree of freedom and multiple degree of freedom systems as well as distributed parameter system

LEARNING OUTCOMES:

1. Able to analyze the structures subjected to dynamic loads due to Earthquake and vibrations due to machines etc.
2. Able to perform the analysis of SDOF and MDOF.
3. Ability to perform dynamic analysis of various structures using Numerical Methods carry out dynamic analysis of base isolated buildings

PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

MODULE CONTENT:

UNIT I : Single Degree of Freedom Systems: Fundamental, Mass spring damper system, Analysis of free vibrations, Response to harmonic loading, periodic loading, Impulsive loading and general dynamic loading. Generalized SDOF, Vibration analysis by Rayleigh method.
UNIT II : Multi Degree of Freedom Systems Two degree of freedom system – undamped free & forced. Multi degree of freedom system-undamped, Hozler's method, Stodola's method.
Unit III: Dynamic analysis and response Orthogonality condition, Damped system. Dynamic analysis and Response- Modal Analysis, Response spectrum analysis, Rayleigh's-Ritz method.
Unit IV: Structures with Distributed Mass and Load Axial, shear and transverse vibration due to bending of beams, Uniform shear beam, Beam in bending, Numerical techniques for shear beam, Bending of beams, Forced vibration, Plates or slabs subjected to normal loads.
Unit V:Earthquake Motion And Response Introduction, Strong motion earthquake, Numerical method for spectra, Elastic spectra, Ground velocity and displacement, Inelastic spectra.
Unit VI: Machine Foundations Design of machine foundations, industrial floors subjected to dynamic loading.

RECOMMENDED BOOKS:

TEXT BOOKS	1. "Structural Dynamics - Theory and Computation" by Mario Paz, CBS publishers, 1999. 2. Dynamics of structures by Anil K. Chopra. 1980
REFERENCE BOOKS	1. Dynamics of Structures by John's Biggs. 1965 2. Elementary Earthquake Engineering by Jai Krishna and Chander shekhar, 2000. 3. Earthquake Resistant Design by Dowrick-Wiley. 1978 4. Dynamic of Structures by Walter c. Hurty & Moshe F. Rubinsten,1984.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3
Class Test	x	x	x
Quiz			x
Assignment	x	x	

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1	2		3	2,3		1				

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER - I

Theory of plates and shells

L	T	P
4	0	0

MODULE CODE	CIVL5102
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will consist of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B & C comprise of short answer type and long answer type questions. These sections will have internal choice.

OBJECTIVES:

The aim of this subject is to develop understanding of the structural behaviour of shells and to analyze the various structures like rectangular plates, cylindrical shells, folded plates etc. using different methods of analysis:

1. To make students aware of the structural behavior of various structures like rectangular plates, cylindrical shells, folded plates etc.
2. To acquire knowledge on different methods of analysis of plates under lateral loads.
3. To get familiar with concepts of orthotropic plates and their applications.
4. To achieve an understanding on basic concepts and classification of shells.
5. To understand different methods of analysis of shells.
6. To enable learner to understand general theory for circular cylindrical shells.

LEARNING OUTCOMES:

1. Able to understand the concept of plates and types of loading on plates.
2. Exposure to various theories of analysis of plates and shells.
3. Enhance the knowledge regarding types of shells.
4. Able to understand the basic functionality circular cylindrical shells.
5. Ability to apply theory of plates and shells to problems involving various geometries and boundary conditions to diverse problems in civil.

MODULE CONTENT:

Unit I: Pure Bending of Plates Slope and curvature, Relation between bending moments and curvature, Strain Energy.
Unit II: Symmetrical Bending Of Circular Plates Differential equation in polar coordinates, Uniformly loaded circular plate with or without a hole at the centre and with various edge conditions.
Unit III: Rectangular Plates Differential equation of the deflection surface (small deflection theory only). Fourier series expansion for various type of loads, Rectangular plate with various loadings and edge conditions, Navier's and Levy's methods.
Unit IV: Orthotropic Plates Differential equation for orthotropic plates. Rigidities for various stiffening systems, Solution for open grids, Navier's solution for orthotropic plates, Working Design of a Coffer slab Construction.
Unit V: Shell Structures Elements of Differential Geometry, Classifications of Shells, Shells of revolution loaded symmetrically with respect to their axis, Membrane theory, Edge disturbance, Application to conical shells, Spherical shells, Shells of revolution under unsymmetrical loading.
Unit VI: Cylindrical Shells Membrane theory, General theory for circular cylindrical shell loaded symmetrically with respect to its axis, Circular cylindrical tank with various edge conditions.

RECOMMENDED BOOKS:

TEXT BOOKS	1. Timoshenko, S."Theory of Plates & Shells" – McGrawHill. 2. Ramaswamy, "Concrete Shell roofs" 3. Szilard,R. "Theory and analysis of plates".
REFERENCE BOOKS	1. Reddy, J. N. "Theory and Analysis of Elastic Plates and Shells," CRC, 2nd edition, December 2006. 2. 2. R. Szilard "Theory and Analysis of Plates," Prentice Hall, 1974. 3. 3. P.L. Gould "Analysis of Shells and Plates," Prentice Hall, 1999.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5
Class Test	x		x		x
Quiz		x			x
Assignment	x	x		x	

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1	2,3	2,5	2,4	5			5			

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
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PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER - I

Advance Concrete Structure

L	T	P
4	0	0

MODULE CODE	CIVL5103
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs.
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will consist of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B & C comprise of short answer type and long answer type questions. These sections will have internal choice.

OBJECTIVES:

The aim of this subject is to impart knowledge to students in the latest technological aspects of concrete Structure and to provide them with opportunities in taking up advanced topics of the concrete structure.

1. To make students aware of the crack and deflection in concrete structure.
2. To acquire knowledge RCC frames and Beam-Column design.
3. To get familiar with design of deep beam and shear walls.
4. To achieve an understanding on basic concepts pre stressed concrete.
5. To understand the load balancing concept of pre stressed members.

LEARNING OUTCOMES:

1. Able to design and carry out the reinforcement detailing of building frames.
2. Able to design deep beam and shear walls.
3. Understand the terminology related to pre-stressing and pre-stressing systems ·
4. Analysis and Design of pre-tensioned as well as post-tensioned concrete beams and slabs using limit state methods ·
5. Analyse and design the anchorage systems for pre-stressing at the construction site

MODULE CONTENT:

Unit I: Introduction Review of Basic Concepts, Behaviour and Design of Reinforced Concrete members considering flexure, Torsion, combined with flexure and flexural shear and axial compression. Estimation of crack width and deflection of reinforced concrete beams. Analysis and design of building frames subjected to wind load, Earthquake forces and structural response.
Unit II:Design and Detailing of Structures Detailing for ductility, Strengthening of existing structures, Design and detailing of structures according to different codes. Ductile detailing of RCC frames.
Unit III: Design of special element Design of beam-column joints, Design of deep beam, Design of shear walls.
Unit IV: Introduction of Pre stressed Concrete Definition, comparison with reinforced concrete, advantages and disadvantages, basic principles, determination of concrete flexural stresses, basic concept method, c line method, load balancing method, classification of members, materials for pre stressed concrete, high strength concrete short-term & long-term properties.
Unit V: Losses in pre stress Pre stressing steel, steel relaxation and other effects, auxiliary materials, pre stress losses, stresses in steel due to loads, cracking moment, deflection under service conditions of loading and pre stressing, determination of strength in bending, sheer and bond.
Unit VI: Design of pre stressed members Design of PSC continuous beams, slab and domes, Analysis and design of PSC members for flexure, shear, bond, torsion and bearing.

RECOMMENDED BOOKS:

TEXT BOOKS	1. R. Park and T. Pauley, Reinforced concrete structures, John Wiley and sons 2. A. K. Jain, Reinforced Concrete: Limit State design, Nem Chand and Bros. 1999. 3.Pre stressed Concrete by Krishna Raju.
REFERENCE BOOKS	3. J. Krishna and OP Jain, Plain and Reinforced Concrete, Vol. I I, Roorkee, Nem Chand and Bros. 4. H. Nilson, D. Darwin and C. W. Dolar, Design of Concrete structures, Tata McGraw Hill 5. Design of Pre stressed Concrete structures by T.Y. Lin 1981

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5	6
Class Test	x	x	x	x		
Quiz		x	x			
Assignment		x		x		

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	2	4		3	5		1				

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
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PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER - I

Material Technology

L	T	P
3	0	0

MODULE CODE	CIVL5104
CREDIT POINTS	3
FORMATIVE ASSESMENT MARKS	25
SUMMATIVE ASSESMENT MARKS	75
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will consist of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B & C comprise of short answer type and long answer type questions. These sections will have internal choice.

OBJECTIVES:

The aim of this subject is to develop understanding on different aspects related to different material and properties useful in construction of structure and enhance skill mentioned below:

1. To make students aware of the chemical composition of Portland cement.
2 .To acquire knowledge and causes of fatigue of concrete
3. To get familiar with concepts factors affecting the strength of concrete
4. To achieve an understanding on basic concepts fiber reinforced concrete metal.
5. To understand the mechanical test of hardened concrete
6. To enable learner to know fact behind temperature and creep in concrete.

LEARNING OUTCOMES:

1. Able to understand the evolution of cement and basic terminology.
2. Able to understand various causes of fatigue in concrete.
3. Enhance the knowledge regarding various factor affecting the strength of concrete.
4. Able to understand the basic on basic concepts fiber reinforced concrete metal.
5. Ability to know various affect of temperature and creep on reinforced structure.

MODULE CONTENT:

Unit I: Cement and Concrete Portland cement: chemical composition, hydration of cement, structure of hydrated cement, mechanical strength of cement gel, water held in hydrated cement paste and heat of hydration. Cements of different types. Elasticity, shrinkage and creep of concrete. Durability of concrete: Permeability of concrete. Chemical attack of concrete, air-entrained concrete and thermal properties of concrete.
Unit II: The mechanical test of hardened concrete Light weight and high density concrete. Mix design. Statistical quality control; Biaxial strength of concrete, production placing compacting and curing of concrete
Unit III: Fibre reinforced concrete metals Behaviour of common constructional metals in tension and compression. True stress-strain curve for mild steel in simple tension. Theories of failure and yield surfaces
Unit IV: Fatigue properties Nature of fatigue failure, fatigue strength for completely reversed stresses, fatigue strength with super imposed static stress and factors influencing fatigue strength, investigation related to cracks and causes of occurrences of cracks.
Unit V: Temperature and Creep properties Low temperature properties ,high temperature properties, creep-stress-time-temperature relations for simple tension, mechanics of creep in tension. Structure of materials and their imperfections. Deformation of crystals and theory of dislocations.
Unit VI: New concretes Introduction polymer concrete, super plasticized concrete, fibre reinforced concrete, sulphur impregnated concrete, roller compacted concrete, ultra high strength concrete.

RECOMMENDED BOOKS:

TEXT BOOKS	3. A.M. Neville, J.J. Brooks, *Concrete Technology*, Low Priced Edition, Pearson Education, 2004. 4. A J Martin, Mechanical behavior of engineering materials. 5. Building construction – sushil kumar.
REFERENCE BOOKS	4. S P Timoshenko, *Strength of materials- Part II* 5. M. S. Shetty, *Concrete technology- Theory & Practice*, S.Chand & Company New Delhi, 2005

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 100marks for theory and 50 marks for practical.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	5
2.	Sessional Test	2	15
3.	Group Discussion	4	5
4.	End Semester Exam	1	75

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5	6
Class Test	x		x		x	
Quiz			x		x	x
Assignment	x	x		x		

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	2	4		3	5		1,6				

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
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PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER - I

Material testing Lab

L	T	P
0	0	2

MODULE CODE	CIVL5105
CREDIT POINTS	1
FORMATIVE ASSESSMENT MARKS	25
SUMMATIVE ASSESSMENT MARKS	25
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

OBJECTIVES:

1. To prepare the students to have hands on experiments and to have exposure to equipment and machines.
2. To make the student to study the property of cement and concrete.
3. To understand strength parameter of concrete.
4. To study the various role of admixture in concrete.
5. To prepare the students to effectively link theory with practice and application and to demonstrate background of the theoretical aspects.

LEARNING OUTCOMES:

1. Able to solve problems including design elements and related to their course work .
2. Able to generate and analyze data using experiments and to apply elements of data statistics.
3. Able to learn the various effect of admixture in concrete .
4. Able to study the variation in strength of cubical and cylindrical blocks.

LIST OF EXPERIMENTS

1.	To determine the tensile strength of cement
2.	To estimate deleterious materials and organic impurities
3.	To determine Soundness by autoclave.
4.	To determine flexural strength of concrete
5.	To determine fineness by specific surface by Blaine air permeability method
6.	To determine compressive strength of cylindrical mould
7.	To study the effects of Admixture Accelerator, Retarder, Super Plasticizer.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 50 marks for practical.

Practical:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1	Internal Assessment	2	25
2	External Assessment	1	25

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1			2	4		3				

EVALUATION

At the end of semester, Subject teacher will submit an evaluation report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the subject with respect to its strengths as well as those areas which could be improved. The review report contains the following:

- Approved refinement decisions due for implementation,
- Actions taken based on previous subject review,
- Problems encountered in the subject delivery,
- Suggested remedies / corrective measures, and
- Report discussed and analysed, actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER - I

Special Problem

L	T	P
0	0	2

MODULE CODE	CIVL5106
CREDIT POINTS	1
FORMATIVE ASSESMENT MARKS	25
SUMMATIVE ASSESMENT MARKS	25
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

A special problem is an individual study in a specialized area under the direction of a faculty of the Department. Student will select a problem after discussing with guide and completes it under his/her supervision. Each special problem must culminate in a written final report, which is to be submitted to the committee appointed by the Head of the Department who will evaluate the performance and award the marks.

Note: The award will be scaled to 25 marks.

PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER – II

MODULE CODE	SUB-CATEGORY	MODULE	L	T	P	C	Internal Marks	External Marks	Total
CIVL5107	PC	ADVANCED STEEL STRUCTURES	4	0	0	4	50	100	150
CIVL5108	PC	MATRIX STRUCTURAL ANALYSIS	4	0	0	4	50	100	150
CIVL5109	SP	SEMINAR	0	0	2	1	25	25	50
MECH5107	PC	FINITE ELEMENT METHODS	4	0	0	4	50	100	150
RESM0101	PC	RESEARCH METHODOLOGY	4	0	0	4	50	100	150
	PE	ELECTIVE - I	4	0	0	4	50	100	150
TOTAL CREDITS			**20**	**0**	**2**	**21**	**275**	**525**	**800**

L = Lecture
T = Tutorial
P = Practical
C = Credit Point

ELECTIVES

MODULE CODE	PROGRAM ELECTIVE I
CIVL5210	DESIGN OF HIGH RISE BUILDING
CIVL5211	WIND ENGINEERING

PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER - II

Advanced Steel Structures

L	T	P
4	0	0

MODULE CODE	CIVL5107
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will consist of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B & C comprise of short answer type and long answer type questions. These sections will have internal choice.

OBJECTIVES:

The aim of this subject is to develop understanding of the structural behavior of steel structures and to analyze various structures using different methods of analysis.

1. To learn the concepts of plastic analysis
2. To have an experience in the complete design of towers.
3. To learn the concept of design of steel bridges.
4. To learn the analysis and design of beams in multi storey buildings.
5. To learn about light gauge steel structure.

LEARNING OUTCOMES:

1. Ability to analyze and design of tension members.
2. Ability to analyze and design of frames.
3. Ability to analyze and design of steel bridges.
4. Ability to analyze and design of towers.
5. Ability to design light gauge steel structures

MODULE CONTENT:

Unit I: Plastic Analysis of Frames Theory of plastic bending, Plastic hinge concept - Mechanism method, Application to continuous portal frames, Plastic moment distribution, Analysis of Gable frames - instantaneous centre of rotation Connections.
Unit II: Connections Bearing type joints - unstiffened and stiffened seat connections, resisting connection of brackets,bolted and welded-semi-rigid connections.
Unit III: Design of Beams Beams subjected to biaxial bending, Built-up Purlins - Various types and design, Design of Wind girders-Beam-columns with various support conditions, Design of foundations with lateral forces
Unit IV: Design of Steel Bridges Design of bridges, trusses, lateral bracings, sway brackets and stress reversals.
Unit V:Towers Basic structural configurations - free standing and guyed towers towers, wind loads, design criteria for different configurations and transmission line tower.
Unit VI: Light Gauge Steel Structures Introduction to Light Gauge Steel Structures and its advantages, Interaction buckling behaviour of cold formed steel members, behaviour and design of compression and tension members.

RECOMMENDED BOOKS:

TEXT BOOKS	1.Design of Steel Structures- S K Duggal, McGraw Hill New Delhi, 2010. 2. Design of Steel Structures by Arya and Ajmani. 3. The steel skeleton Volume I and II by J.F. Baker Publication English Language Book Society. 4. Steel Structure- Design and Behaviour Salmon and Johnson Publication Harper And Row.
REFERENCEBOOKS	1. Structural Steel Designer's Hand Book by Merritt. 2. Plastic Design of Steel Frames by LYNN.S.Beedle. 3. Handbook for Structural Engineers, SP: 6(6)-1972. 4. Design of Steel Structures- Ramchandra, Vol I & II Standard Book House, Delhi, 1975 8.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3
Class Test	x	x	x
Quiz			x
Assignment	x	x	

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	C	d	e	f	g	h	i	j	K
Course Learning Outcomes			1,2, 3,4	3	2,3						

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

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PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER II

Matrix structural analysis

L	T	P
4	0	0

MODULE CODE	CIVL5108
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will consist of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B & C comprise of short answer type and long answer type questions. These sections will have internal choice.

OBJECTIVES:

To introduce matrix force and displacement methods for two and three dimensional structures including programming aspects.

1. To introduce fundamental characteristics of elements and system by evaluation of its flexibility and stiffness matrices
2. To impart knowledge about analysis of system through direct and element approach of flexibility method
3. Analysis of structures by direct and element approach of stiffness method is to be included
4. Programming techniques for simple problems and use of standard programmes to be practiced
5. Awareness to the use of advanced techniques of matrix methods are to be created.

LEARNING OUTCOMES:

1. Analyse framed structures using flexibility and stiffness method.
2. Develop computer programs for analysis of framed structure.
3. Use effectively commercial software for analysis and design of structures.
4. Analyse structure having member discontinuities, curved members, non-prismatic members, elastic supports, semi-rigid connections etc.

MODULE CONTENT:

UNIT I: Fundamental concepts Force and displacement measurement, Generalised or independent measurements, constrained or dependent measurements, Concept of flexibility and stiffness using systems of springs, Reciprocal relationships between stiffness and flexibility, Stiffness and flexibility in constrained measurements, Coordinate system: structure idealization stiffness and flexibility matrices.
UNIT II: Flexibility method Direct method applied to beams and frames, Relationship between element and system, Strain Energy in terms of flexibility coefficients, Elements flexibility equation.
Unit III: Stiffness method Direct stiffness method to beams, frames and simple trusses, Strain energy in terms of stiffness coefficients, Relationship between element and systems, Static condensation techniques, Problems in beams, frames including secondary effects, Suitability element stiffness equation.
Unit IV: Programming Programming of solution techniques for simultaneous equation solution, Matrix operation and Simple program development for element stiffness matrix, assemblage and Complete structure of a stiffness analysis program with subroutines, Use of GTSTRUDL / STAAD / SAP to solve problems in trusses, Beams and frames.
Unit V: Advanced topics Sub structuring techniques, Force and displacements, Band width, Reduction, Tridiagnolisation technique, Band solvers, Frontal, Solvers, Re analysis technique, Transfer matrix method, Use of symmetry and anti-symmetry.
Unit VI: Analysis of 3D structures Concept of 3D modelling, Matrix displacement analysis of 3D structures, Grid and pin jointed trusses.

RECOMMENDED BOOKS:

TEXT BOOKS	1. Jack. C, McCormac, Structural Analysis: Using Classical and Matrix Methods, John Wiley, Fourth Edition, 2007. 2. Rajasekaran.S, Sankarasubramanian.,Computational Structural Mechanics, Prentice Hall of India Pvt Ltd, New Delhi - 110 001, First Edition, 2001.
REFERENCE BOOKS	1. Beaufit F.W et al. Computer Methods of Structural Analysis, Prentice Hall, 1970. 2. 5. John L.Meek, Matrix Structural Analysis, Mc Graw Hill Book Company, 1971.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5	6
Class Test	x		x		x	
Quiz			x		x	x
Assignment	x	x		x		

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	A	b	C	d	e	f	g	h	i	j	k
Course Learning Outcomes		4		1,2				3			

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
- Actions taken based on previous course review; and
- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER - II

Seminar

L	T	P
0	0	2

MODULE CODE	CIVL5109
CREDIT POINTS	1
FORMATIVE ASSESMENT MARKS	25
SUMMATIVE ASSESMENT MARKS	25
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

Every student will be required to submit a report and present a seminar talk on a topic guided by a faculty.

The Head of the Department will constitute a committee to evaluate the presentation and award marks.

Note: The award will be scaled to 25 marks.

PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER II

FINITE ELEMENT METHOD

L	T	P
4	0	0

MODULE CODE	MECH5107
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs.
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will consist of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B & C comprise of short answer type and long answer type questions. These sections will have internal choice.

OBJECTIVES:

1. To get familiar with the Finite Element Analysis fundamentals.
2. To generate element stiffness matrices for fem problems.
3. To formulate the design problems into FEA.
4. To perform engineering simulations using Finite Element analysis software (ANSYS & LS- DYNA).

LEARNING OUTCOMES:

1. Have an understanding of the principles and concepts related to finite element methods.
2. Able to implement finite element methods for simple 1-D problems such as truss analysis and 1-D heat conduction either by hand calculation or by programming.
3. Able to numerically solve for stresses, strains and deformation of a structural component due to axial load, torsion, and bending, acting individually or in combination.
4. Able to numerically solve for stresses, strains and deformation of a structure under either plane-stress or plane-strain conditions.
5. Have a basic knowledge about finite element methods for solving time-dependent and/or non-linear problems.

MODULE CONTENT:

Unit-I: Introduction Fundamentals; Description of method; Matrix techniques; Large system of algebraic equations; Basics of solid mechanics; Stress and strain relationships in elastic behavior - linear and non linear.
Unit-II: Variational methods Variational methods in solid mechanics; Minimum potential energy and minimum complementary energy; Application to FE methods.
Unit-III: Theory of finite element method Element shapes – one, two, three dimensional and axisymmetric elements; Displacement models in generalized coordinates; Convergence; Nodal degrees of freedom; Interpolation displacement models.
Unit-IV: Elements of fem Element stresses and strains; Element stiffness and loads; Lumped loads; Variational formulation of element stiffness and lumped load; Numerical integration; Condensation of internal degrees of freedom.
Unit-V: Solution of fem problem Assemblage of Elements; Discretization of a body or structure; Effect of element aspect ratio; Infinite bodies; Higher order elements and refinement of mesh; Nodal compatibility and interface displacement compatibility; Assembly stiffness matrix; Boundary conditions; Solution for element stress or strain.
Unit-VI: Application of finite element method Application of FEM to problems in mechanics; Fluid flow and structural element; Making Computer Codes for FEM solutions.

RECOMMENDED BOOKS:

TEXT BOOKS	1. Introduction to the Finite Element Method: CS Desai and JF Abel Van Nostrand Reinhold Co., New York. 2. Finite Element: OC Zienkiewicz Butterworth-Heinemann, London.
REFERENCE BOOKS	1. Finite Element Procedure: Klaus-Jurgen Bathe Prentice Hall, New York. 2. Concept and Applications of Finite Element Analysis: R Cook, D Malkus, M Plesha and R Witt M. Wiley, New York.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	**1**	**2**	**3**	**4**	**5**
Class Test	x		x		
Quiz		x	x		x
Assignment	x			x	x

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	C	d	e	f	g	h	i	j	k
Course Learning Outcomes	2,4		5	2	4,5	3		3	4	2	

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
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PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER - II

Research Methodology

L	T	C
4	0	4

MODULE CODE	RESM0101
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will consist of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B & C comprise of short answer type and long answer type questions. These sections will have internal choice.

OBJECTIVES:

The aim of teaching this subject is to impart knowledge primarily related to research methodology so that learner will be able to understand the research design and represent the research work. Some of the objectives of the course are:

7. To acquire basic knowledge research.
8. To get familiar with different types of research design.
9. To understand the basic of data collection.
10. To get familiar with the different techniques of data analysis.
11. To acquire basic knowledge of technical writing.
12. To get the knowledge of using tools and techniques in research.

LEARNING OUTCOMES:

6. Able to understand importance of research and its type.
7. Able to understand research papers and type of research design.
8. Able to formulate the research problem.
9. Able to choose the appropriate data analysis tool.
10. Able to justify with the type of research by publishing it at appropriate platform.
11. Able to use different types of softwares and techniques in research writing.

MODULE CONTENTS:

Unit I: Introduction to Research and Problem Definition Meaning, Objective and importance of research, Types of research, steps involved in research, defining research problem.
Unit II: Research Design Research Design: Concept and Importance in Research, Features of a good research design, Exploratory Research Design: concept, types and uses, Descriptive Research Designs: concept, types and uses. Experimental Design: Concept of Independent & Dependent variables. Literature Survey.
Unit III: Data collection Classification of Data, Methods of Data Collection, Sampling, Sampling techniques procedure and methods, Ethical considerations in research Problem Identification & Formulation: Hypothesis, Qualities of a good Hypothesis, Null Hypothesis & Alternative.
Unit IV: Data analysis Statistical techniques and choosing an appropriate statistical technique, Data processing softwares (e.g. SPSS etc.), Interpretation of results Data Preparation: Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis (Cross tabulations and Chi-square test)
Unit V: Technical Writing and reporting of research Types of research report: Dissertation and Thesis, research paper, review article, short communication, conference presentation etc., Referencing and referencing styles. Research Journals, Indexing and citation of Journals, Impact factor of Journals, Ethical issues related to publishing, Intellectual property Plagiarism and Self-Plagiarism.
Unit VI: Use of Tools and Techniques for Research Use of Encyclopedias, Research Guides, Handbook etc., Academic Databases. methods to search required information effectively, Reference Management Software like Zotero/Mendeley, Software for paper formatting like LaTeX/MS Office, Software for detection of Plagiarism.

RECOMMENDED BOOKS:

TEXT BOOKS	1. C. R. Kothari, Gaurav Garg, Research Methodology Methods and Techniques , New Age International publishers, Third Edition. 2. Ranjit Kumar, Research Methodology: A Step-by-Step Guide for Beginners, 2nd Edition, SAGE, 2005 3. Business Research Methods – Donald Cooper & Pamela Schindler, TMGH, 9th edition
REFERENCE BOOKS	1. Creswell, John W. Research design: Qualitative, quantitative, and mixed methods approaches. Sage publications, 2013. 2. Business Research Methods – Alan Bryman & Emma Bell, Oxford University Press. 3. Select references from the Internet

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	**1**	**2**	**3**	**4**	**5**	**6**
Class Test	x	x	x			
Quiz	x	x				x
Assignment		x	x	x	x	x

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	B	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	3,4	5	3,5						4		

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

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PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER – II (Elective-I)

Design of High Rise Building

L	T	P
4	0	0

MODULE CODE	CIVL5210
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs.
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will consist of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B & C comprise of short answer type and long answer type questions. These sections will have internal choice.

OBJECTIVES:

The aim of this subject is to impart knowledge to *familiarize* the students with the methods of analysis of tall steel and concrete buildings under various loading conditions.

1. To learn principles of stability of high rise buildings.
2. To design the high rise buildings for earthquake and wind resistance.
3. To evaluate the performance of high rise structures for strength and stability.

LEARNING OUTCOMES:

1. Achieve Knowledge of design and development of problem solving skills.
2. Understand the principles of strength and stability
3. Design and develop analytical skills.
4. Summarize the behavior of various structural systems.
5. Understand the concepts of P-Delta analysis.

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DEPARTMENT OF CIVIL ENGINEERING

MODULE CONTENT:

UNIT-I:Design Criteria Design philosophy, loading, sequential loading, and materials – high performance concrete, fiber reinforced concrete, lightweight concrete, design mixes. Loading and Movement: Gravity loading: Dead and live load, methods of live load reduction, Impact, Gravity loading, Construction loads.
UNIT-II: Wind and Earthquake loading Static and dynamic approach, Analytical and wind tunnel experimentation method. Equivalent lateral force, modal analysis, combinations of loading, working stress design, Limit state design, Plastic design.
UNIT-III: Behavior of Various Structural Systems Factors affecting growth, Height and structural form; High rise behavior, Rigid frames, braced frames, in-filled frames, shear walls, coupled shear walls, wall-frames, tubular, cores, Futigger – braced and hybrid mega system.
UNIT-IV: Analysis and Design Modeling for approximate analysis, accurate analysis and reduction techniques, analysis of building as total structural system considering overall integrity and major subsystem interaction, analysis for member forces; drift and twist, computerized general three dimensional analyses.
UNIT-V:Stability of Tall Buildings Overall buckling analysis of frames, wall frames, approximate methods, second order effects of gravity of loading, P-Delta analysis, simultaneous first order and P-Delta analysis, Transnational, Torsional instability, out of plum effects, stiffness of member in stability, effect of foundation rotation.
UNIT-VI: Structural elements Sectional shapes, properties and resisting capacities, design, deflection, cracking, pre-stressing, shear flow. Design for differential movement, creep and shrinkage effects,temperature effects and fire.

RECOMMENDED BOOKS:

TEXT BOOKS	1. Taranath Bungale, "Structural Analysis and Design of Tall Buildings" McGraw Hall 2. Beedle L.S. "Advances in Tall Buildings" VMR. 3. Wilf gang Schuller, "High rise building structures"- John Wiley
REFERENCE BOOKS	1. Lynn S.Beedle, "Advances in Tall Buildings"- CBS Publishers and Distributors. 2. Dr. Y.P. Gupta – Editor, "Proceedings National Seminar on High Rise Structures- Design and Construction practices for middle level cities"- New Age International Limited.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5	6
Class Test	X	x	x	x		
Quiz		x	x			
Assignment		x		x		

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	C	d	e	f	g	h	i	j	k
Course Learning Outcomes	2	4		3	5		1				

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

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PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER – II(Elective – I)

Wind Engineering

L	T	P
4	0	0

MODULE CODE	CIVL5211
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will consist of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B & C comprise of short answer type and long answer type questions. These sections will have internal choice.
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OBJECTIVES:

1. To introduce concept of wind flow
2. To give knowledge on static and dynamic wind load analysis
3. To give exposure to Indian Standard code for wind
4. To enable students to do static wind load based design
5. To introduce students to wind tunnels
6. To perform experiments on wind effects on structures.
7. To familiarize the students regarding wind loading and the effects of wind on behaviour of buildings and other structures.

LEARNING OUTCOMES:

1. In depth knowledge of IS - 875(Part 3),
2. Indian Standard Code for wind load on structures
3. Knowledge about wind tunnels and various aspects of wind flow.
4. Ability to do static and dynamic analysis for wind loading
5. Ability to design a structure for different types of wind induced loadings.

MODULE CONTENT:

Unit I: Introduction Historical background to wind loading, Causes and types of wind, Factors affecting wind loading.
Unit II: Wind Characteristics Variation of wind velocity, atmospheric circulations – pressure gradient force, coriolis force, frictionless wind balance, geotropic flow, boundary layer. Extra ordinary winds – Fen Cohen, Bora, Cyclones, Tornadoes etc., Static wind effects and building codes with particular reference to IS 875 (Part-III), wind speed map of India, introduction to the proposed revisions of IS 875 (Part III).
Unit III: Wind Characteristics Turbulence characteristics, Bluff body aerodynamics, Wind pressure and forces on buildings and structures.
Unit IV: Introduction to random vibrations Along wind and across wind response of tall buildings. Wind tunnel testing: Open circuit and closed circuit wind tunnels, rigid and aero elastic models, wind tunnel measurements and instruments along with site visit.
Unit V:Towers and slender structures Cladding systems and Mechanical damping system, wind tunnel testing and simulation techniques.
Unit V:Case studies low rise buildings, parking sheds, workshop building, multi-storey building, water tanks, towers, chimneys, bridges

RECOMMENDED BOOKS:

TEXT BOOKS	1. An Introduction to Wind Engineering John Wiley & Sons,E. Simiu & R.H Scalan. 2. Structural Analysis and Design of Tall Buildings- B.S Taranath. 3. Relevent IS Codes.
REFERENCE BOOKS	1. EmilSimiu and R. H. Scanlan, "Wind Effects on Structures – An Introduction to Wind Engineering", John Wiley and Sons, New York, 986. 2. C. Scruton, "An Introduction to Wind Effects on Structures", Oxford University Press, Oxford,UK, 198

METHODS OF TEACHING AND STUDENT LEARNING

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ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5
Class Test	x		x		x
Quiz		x			x
Assignment	x	x		x	

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	C	d	e	f	g	h	i	j	k
Course Learning Outcomes	1	2,3	2,5	2,4	5			5			

EVALUATION

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PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER -III

MODULE CODE	CATEGORY	MODULE	L	T	P	C	INTERNAL MARKS	EXTERNAL MARKS	TOTAL
CIVL6101	PC	DESIGN OF HYDRAULIC AND LIQUID RETAINING STRUCTURES	3	1	0	3.5	50	100	150
CIVL6102	PC	EARTHQUAKE RESISTANT STRUCTURES	3	1	0	3.5	50	100	150
CIVL6103	PC	DESIGN OF BRIDGES	4	0	0	4	50	100	150
CIVL6104	PC	COMPUTATIONAL LABORATORY	0	0	2	1	25	25	50
CIVL6105	DI	LITERATURE SURVEY (DISSERTATION STAGE 1)*	0	0	0	2	50	50	100
	PE	ELECTIVE-II*	4	0	0	4	50	100	150
	GE	ELECTIVE- B**	4	0	0	4	50	100	150
TOTAL CREDITS			**18**	**2**	**2**	**22**	**325**	**575**	**850**

L = Lecture

T = Tutorial

P = Practical

C = Credit Point

ELECTIVES

MODULE CODE	GENERIC ELECTIVE - B**
SAPA0320	SAP (ABAP)ψ
SAPM0321	SAP (MM)ψ
SAPS0322	SAP (SD)ψ
SAPF0323	SAP (FI)ψ
SAPH0324	SAP (HR)ψ
CCNA0325	CCNA ψ
MECH6302	THEORY OF ELASTICITY
MODULE CODE	**PROGRAM ELECTIVE II***
CIVL6205	SOIL - STRUCTURE INTERACTION
CIVL6206	REMOTE SENSING AND GIS IN ENGINEERING

ψAdditional fee, if any, shall be borne by the student.

#Students are to earn 2 credits on review of litrature in 3rd semester out of 12 credits in total assigned to dissertation, to be completed in 4th semester.

PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER – III

Design of Hydraulic and Liquid Retaining Structure

L	T	P
3	1	0

MODULE CODE	CIVL6101
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will consist of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B & C comprise of short answer type and long answer type questions. These sections will have internal choice

OBJECTIVES:

To educate the students in detailed concepts related to water transmission mains, water distribution system, sewer networks and storm water drain, with emphasis on computer application

1. To understand about the methods of analysis and design of water tanks and the types of cement roofing system To get familiar with concepts Design of tanks
2. To understand in detail about the design of various embankment used in dam and water proofing .
3. To understand the designing of steel water tanks.
4. To enable learner to understand canal regulation structure.

LEARNING OUTCOMES:

1. To make them understand the fundamentals of Structural design of Concrete, Prestressed Concrete, Steel and Cast iron etc
2. To understand in detail about the design of special purpose structures like underground reservoirs and swimming pools
3. To improve the knowledge on the repair and rehabilitation of structures and also diagonising and identification of the cause and damage in various liquid retaining structure
4. To know about the exposure on steel, lattice structures used to know about the exposure on steel, lattice structures used in water and sewerage

MODULE CONTENT:

Unit I:Introduction of Containers Types of Tanks, Materials, Types of joints, their spacing anddesign, Design considerations, Cover requirement, tanks resting on ground, Circular andrectangular tanks.
Unit II: Under Grounds and Elevated Tanks Circular and rectangular tanks, Problem of high ground watertable, Tanks containing liquids at high temperature.Elevated tanks of different shapes with staging arrangement of columns / cylindrical shaft, Design of tank foundations.
Unit III: Elevated Steel Tanks Circular tanks with conical bottom, Circular tank with segmental bottom, Design considerations, Staging, Pressed steel plate tanks.
Unit IV: Gravity Dams Planning and investigations of reservoir and dam sites, Choice of dams, preparationandprotection of foundation and abutments.Forces acting on solid gravity dam, modes of failures, stability analysis, elementary andpractical profile of gravity dam, internal stresses and stress concentrations in gravity damjoints, seals, keys in gravity dams, dam safety and hazard mitigation.
Unit V: Homogeneous and zoned embankment dams Homogeneous and zoned embankment dams ,factors influencing design of embankmentdams, criteria for safe design of embankment dam, steps in design of embankment dam,seepage analysis and its control through body and dam foundation, classification of rock filldams and their design considerations**.**
Unit VI:Canal regulation structures Canal regulation structures and design of cross drainage works, canal drops, operation andmaintenance of canals.

RECOMMENDED BOOKS:

TEXT BOOKS	1. Concrete Structures by Vazirani&Ratwani. 2. Reinforced Concrete Structures by I.C.Syal&A.K.Goel. 3. USBR, "Design of gravity dams", A Water Resources Technical Publication, Denver, Colorado
REFERENCE BOOKS	1. Design of Steel Structures by Arya and Ajmani. 2. Engineering for dams Creager W P, Justin J D and Hinds J., Nemchand and Brothers

METHODS OF TEACHING AND STUDENT LEARNING

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ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5
Class Test	x		x		x
Quiz		x			x
Assignment	x	x		x	

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	C	d	E	f	g	h	i	j	k
Course Learning Outcomes		1		3	2			4			

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
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- Report discussed and analysed; actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER - III

Earthquake Resistant Structures

L	T	P
3	1	0

MODULE CODE	CIVL6102
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will consist of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B & C comprise of short answer type and long answer type questions. These sections will have internal choice

OBJECTIVES:
The aim of this subject is to develop understanding on different aspects related to earthquake resistant structures and different system to enhance skills in earthquake engineering as mentioned below:

1. To understand the principles of vibration with regard to single degree of freedom system.
2. To carry our dynamic analysis of moment resistant frames.
3. To determine the design lateral forces by means of codal provisions.
4. To introduce the concept of ductility and corresponding detailing.
5. To expose the students to base isolation techniques earthquake induced damages.

LEARNING OUTCOMES:

1. Able to evaluate seismic forces for various structures as per relevant Indian standard.
2. Able to design and ductile detailing of structures for resistance as per Indian standards.
3. Able to apply concepts of repair and rehabilitation of earthquake affected structures.
4. Able to apply concepts of detailing for ductility of earthquake affected structures.
5. Able to understand behavior of RC structure.

MODULE CONTENT:

UNIT I: Single degree of freedom system(SDOF) Systems with single degree of freedom - equation of motion - Analysis of free vibrations - Response to harmonic, impulsive, periodic and general dynamic loading - free and forced vibration – modeling of SDOF system under earthquake load.
UNIT-II: Multi-Degree of freedom system(MDOF) Modeling of shear frames as 2 degree of freedom system- modal analysis – free vibration – and forced vibration with harmonic loading – determination of nodal forces from first principles.
UNIT-III: Design seismic forces Codal provision for design - IS 1893-2002 – Response spectrum – determination of lateral forces – base shear – by response spectrum method for 2 storey moment resistant frame-calculation of drift Aspects in planning and layout - regular and irregular buildings-calculation of centre of mass and centre of rigidity for simple layouts- eccentricity and torsion
UNIT-IV:Detailing for ductility Ductility-codal provision for detailing for earthquake resistance- IS 13920-1993 and IS1893:2002 Shear and detailing. wall design.
UNIT-V:Special Topics Repair and Rehabilitation techniques - seismic damage ratings - Passive and Active control of vibration - New and favorable materials - case studies in repair and rehabilitation.
UNIT VI Behaviour of RC Structures: Load Transfer Path, Strength Hierarchy, Reversal of Stresses, Importance of Beam Column Joints, Importance of Stiffness and Ductility (Capacity Design Concept) in Structures, Effect of Short Column, Effect of Soft Storey, Improper Detailing, Effect of Masonry Infill Walls.

RECOMMENDED BOOKS:

TEXT BOOKS	1. Earthquake Resistant Design of Structures, Pankaj Agrawal, Manish Shrikhande, PHI Learning. 2. IS 1893-2002 Indian Standard Criteria for Earthquake Resistant Design of Structures. 3. IS 4326-1993 2002 Indian Standard for Earthquake Resistant Design and Construction of Buildings. 4. IS 13920-1993 2002 Ductile detailing of Reinforced Concrete Structures subjected to Seismic Forces.
REFERENCE BOOKS	1. Dynamics of Structures: Theory and Applications to Earthquake Engineering, AK Chopra, Prentice Hall 2. Dynamics of Structures, R.W. Clough and Joseph Penzien McGraw-Hill Education. 3. Structural Dynamics by Mario & Paz, Springer. 4. Earthquake Resistant Design by David J. Dowrick, Wiley India Pvt Ltd

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed.Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5	6
Class Test	x		x		x	
Quiz		X			x	x
Assignment	x			x		x

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	C	d	e	f	g	h	i	j	k
Course Learning Outcomes	1,2	2,3	2,3,5	2,3	5	4,5					

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
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PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER - III

Design of Bridges

L	T	P
4	0	0

MODULE CODE	CIVL6103
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will consist of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B & C comprise of short answer type and long answer type questions. These sections will have internal choice

OBJECTIVES:
The aim of this subject is to develop understanding on different aspects related to bridges and design of bridges of different types to enhance skills in civil engineering as mentioned below:

1. To develop an understanding of basic concepts in proportioning and design of bridges in terms of aesthetics, geographical location and functionality.
2. To help the student develop an intuitive feeling about the sizing of bridge elements, i.e. develop a clear understanding of conceptual design.
3. To understand the load flow mechanism and identify loads on bridges.
4. To carry out a design of bridge starting from conceptual design,
5. To select suitable bridge, geometry to sizing of its elements.

LEARNING OUTCOMES:

1. Able to know about basics of bridge engineering.
2. Able to understand the load-carrying capacity of various types of bridges, upon learning the structural responses to different kinds of loads.
3. Able to design short and medium span bridges, with confidence using existing codes of practice, taking into account of the structural strength, service life and durability.
4. Able know the limitations of the design methods used.

MODULE CONTENT:

UNIT-I: General Bridge systems Considerations in alignment, Planning, Economic considerations, Aesthetics and selection of type of bridge, Bridge Hydrology, Scour Depth, Depth of foundation, Estimation of Design Discharge
UNIT-II: Loading Standards Specifications for loading, geometrical proportioning etc. Road, Rail-cum-Road bridges, Indian Road Congress and Indian Railway loading standards and their comparison with loading standards followed in U.K., U.S.A. and Europe.
UNIT-III: Design of Bridges Reinforced Concrete Bridges, Slab culverts, T-Beam Bridges, Box Girder Bridges.
UNIT-IV: Design of sub structure Pier and abutments caps, Design of pier,Abutments – Type of foundations.
UNIT V Dynamic Response of Bridges Design considerations for pre-stressed bridges, trussed steel, Cable stayed and suspension bridges.
UNIT-VI Bearings for Bridges Importance of Bearings Bearings for slab bridges, Bearings for girder bridges, Electrometric bearing – Joints – Expansion joints.

RECOMMENDED BOOKS:

TEXT BOOKS	1. Bridge engineering by S.Ponnuswamy, TataMcGraw-Hill 2. Bridge superstructure by N.Rajagopalan, Narosa Publishing
REFERENCE BOOKS	1. Design of Bridges, N. Krishna Raju, Oxford and IBH 2. Victor D.J, Essential of Bridge Engineering Oxford & 3. N. Rajagopalan, Bridge Superstructure, Narosa

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed.Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5	6
Class Test		x	x	x		
Quiz	x		x			x
Assignment		x		x	x	

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	C	d	e	f	g	h	i	j	k
Course Learning Outcomes	1,2	2,3	2,3	2,3	5	4,					

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
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PDM UNIVERSITY
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SEMESTER - III

Computational Laboratory

L	T	P
0	0	2

MODULE CODE	CIVL6104
CREDIT POINTS	1
FORMATIVE ASSESSMENT MARKS	25
SUMMATIVE ASSESSMENT MARKS	25
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

OBJECTIVES:

The aim of this subject is to develop understanding on different aspects related to civil engineering material and to enhance skills as mentioned below:

1. To prepare the students to have hands on experiments and to have exposure to Computer programming in C++ related to to solve problems related to civil engineering.
2. To make the student to study the property of analysis of structures through programming.
3. To prepare the students to effectively link theory with practice and application and to demonstrate background of the theoretical aspects.

LEARNING OUTCOMES:

1. Able to solve problems including design elements and related to their course work.
2. Able to generate and analyze data using experiments and to apply elements of data statistics.
3. The purpose behind this course is to make the students familiar with the software available in structural engineering.

LIST OF EXPERIMENTS

1.	Computer programming in C++.
2.	Development of computer programs to solve problems related to civil engineering using matrix method.
3.	Development of Finite Element Programming for analysis of beams.
4.	Development of Finite Element Programming for analysis of truss.
5.	Development of Finite Element Programming for analysis of frames.
6.	Analysis of plates and shells using commercial softwares.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 50 marks for practical.

Practical:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1	Internal Assessment	2	25
2	External Assessment	1	25

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Learning Outcomes	1			2	4		3				

EVALUATION

At the end of semester, Subject teacher will submit an evaluation report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the subject with respect to its strengths as well as those areas which could be improved. The review report contains the following:

- Approved refinement decisions due for implementation,
- Actions taken based on previous subject review,
- Problems encountered in the subject delivery,
- Suggested remedies / corrective measures, and
- Report discussed and analysed, actions taken as a result of this process and are communicated to the main stakeholders.

PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER – III

SOIL STRUCTURE INTERACTION (ELECTIVE- II*)

L	T	P
4	0	0

MODULE CODE	CIVL 6205
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will consist of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B & C comprise of short answer type and long answer type questions. These sections will have internal choice

OBJECTIVES:

The aim of the course is to provide the participants an understanding of effectively simulating the soil-structure interaction problems using computer applications and realistic material models. At the end of the course, the participants are expected to have fair understanding of:

1. Basics of Finite Difference and Finite Element Analysis.
2. Realistic material models for structural materials, soils and interfaces/joints.
3. Modeling of engineering systems and Soil-Structure Interaction (SSI) using computer methods for a number of practical problems in geotechnical engineering.

LEARNING OUTCOMES:

1. Understand the basic elements of SSI such as inertial and kinematic effects.
2. Learn how to evaluate kinematic interaction parameters for shallow foundations.
3. Able to understand methods of analysis of structures with SSI effects

MODULE CONTENT:

UNIT-I :SOIL-FOUNDATION INTERACTION Introduction to soil - Foundation interaction problems, Soil behaviour, Foundation behaviour, Interface, behaviour, Scope of soil-foundation interaction analysis
Unit II:MODEL ANALYSIS Soil response models, Winkler, Elastic continuum, Two parameter elastic models, Elastic plastic behaviour, Time dependent behaviour.
Unit III:BEAM ON ELASTIC FOUNDATION SOIL MODELS Infinite beam, Two parameters, Isotropic elastic half space, Analysis of beams of finite length, Classification of finite beams in relation to their stiffness.
Unit IV:PLATE ON ELASTIC MEDIUM Infinite plate, Winkler, Two parameters, Isotropic elastic medium, Thin and thick plates, Analysis of finite plates, rectangular and circular plates, Numerical analysis of finite plates, simple solutions.
Unit V:ELASTIC ANALYSIS OF PILE Elastic analysis of single pile, Theoretical solutions for settlement and load distribution, Analysis of pile group, Interaction analysis, Load distribution in groups with rigid cap.
Unit VI:LATERALLY LOADED PILE Load deflection prediction for laterally loaded piles, subgrade reaction and elastic analysis, Interaction analysis, and pile raft system, solutions through influence charts.

RECOMMENDED BOOKS:

TEXT BOOKS	6. McCarthy, D.F. Essentials of Soil Mechanics and Foundations, basic geotechnics (6th Edition), Prentice Hall, 2002. 7. Selvadurai, A.P.S., Elastic Analysis of Soil Foundation Interaction, Elsevier, 1979.
REFERENCEBOOKS	1. Hemsley, J.A, Elastic Analysis of Raft Foundations, Thomas Telford, 1998. 2. Poulos, H.G., and Davis, E.H., Pile Foundation Analysis and Design, John Wiley, 1980. 3. Scott, R.F. Foundation Analysis, Prentice Hall, 1981. 4. Structure Soil Interaction - State of Art Report, Institution of structural Engineers, 1978. ACI 336, Suggested Analysis and Design Procedures for Combined Footings and Mats, American Concrete Institute, Dehit, 1988.

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed.Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3
Class Test	x	x	x
Quiz			x
Assignment	x	x	

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	d	e	f	g	h	i	J	k
Course Learning Outcomes	1	2		3	2,3		1				

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
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PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER - III

Remote Sensing and GIS in Engineering (Elective-II*)

L	T	P
4	0	0

MODULE CODE	CIVL6206
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs.
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will consist of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B & C comprise of short answer type and long answer type questions. These sections will have internal choice

OBJECTIVES:

1. To introduce the students to the basic concepts and principles of various components of remote sensing.
2. To provide an exposure to GIS and its practical applications in civil engineering.
3. To provide exposure to students in gaining knowledge on concepts and applications leading to modeling of earth resources management using Remote Sensing 2. To acquire skills in storing, managing digital data for planning and development.
4. To provide exposure to data models and data structures in GIS and to introduce various Raster and Vector Analysis capabilities.
5. To expose the concept of quality and design of cartographic outputs in open GIS environment.

LEARNING OUTCOMES:

1. Fully equipped with concepts, methodologies and applications of Remote Sensing Technology.
2. Prepare the candidates for National and Global Employability
3. Acquire skills in handling instruments, tools, techniques and modeling while using Remote Sensing Technology
4. It empowers the candidate with confidence and leadership qualities.

MODULE CONTENT:

UNIT I - Introduction And Concepts Introduction of Remote Sensing – Energy sources and Radiation principles, Energy equation, EMR and Spectrum, EMR interaction with Atmosphere- scattering, Absorption, EMR interaction with earth surface features- reflection, absorption, emission and transmission, Spectral response pattern , vegetation, soil, water bodies Spectral reflectance.
UNIT II-Sensors Characteristics Platforms: airborne and space borne; Satellite orbits: geostationary and near polar; Image data characteristics: spatial, spectral, radiometric and temporal; Satellite missions of ISRO and LANDSAT programme with their image characteristics; History, development and set up of Remote Sensing Programme of India, USA, Russia, China and ESA.
UNIT III-Remote Sensing Satellites Land observation satellites, characters and applications, IRS series, LANDSAT series, SPOT series, High resolution satellites, character and applications, CARTOSAT series, IKONOS Series, QUICKBIRD series, Weather/Meteorological satellites, INSAT series, NOAA, GOES, NIMBUS Applications, Marine observation satellites OCEANSAT
UNIT IV-Basics Of Gis Introduction, concepts , Information system , components of GIS, History, Geospatial data architecture, Operations, Geographic co ordinate systems, Map projections, concepts, Input data for GIS , display ,types of output products. GIS categories, Level and scale of Measurement, importance of data quality
UNIT V- Introduction To Gis Softwares Defining GIS -introduction to Spatial Data File Formats - Basics of ArcCatalog and Arc Map, Tabular Data Design, Functions, pitfall and Reprocessing, Tables, Queries, and Basic Geoprocessing Tools, Data sources and data collection data files in ArcMap and ArcPad, The Raster Data File Format-, Overview of MAP INFO, QGIS, ERDAS IMAGINE
UNIT VI-Vector Data & Processing GIS data types, data Representation, Data sources, typical GIS data sets, Data Acquisition, vector data model , topology, topology rules, Non topological vector data, object based vector data model, relationship between classes, data structure, data verification and editing spatial data models and errors – GIS database , attribute data input and management

RECOMMENDED BOOKS:

TEXT BOOKS	1. Kang tsung Chang ., Introduction to Geographical Information System, Tata McGraw Hill, 7th edition, 2010 2. A.M. Chandra and S.K. Ghosh. Remote Sensing and Geographical Information system. Narosa Publishing House, New Delhi. 2006
REFERENCE BOOKS	1. Menno-Jan Kraak, Ferjan Ormeling, Cartography: Visualization of Spatial Data, 2009, 3rd Edition, Pearson Publishers. 2. Kang-tsung Chang , Introduction to Geographical Information System, , Fourth Edition, Tata McGraw Hill,2008

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 100 marks for theory.

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3	4	5	6
Class Test	x	x	x	x		
Quiz		x	x			
Assignment		x		x		

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	D	e	f	g	h	i	j	k
Course Learning Outcomes	2	4		3	5		1				

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
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DEPARTMENT OF CIVIL ENGINEERING

SEMESTER - III

ELECTIVE- B*

THEORY OF ELASTICITY

L	T	P
4	0	0

MODULE CODE	MECH6102
CREDIT POINTS	4
FORMATIVE ASSESMENT MARKS	50
SUMMATIVE ASSESMENT MARKS	100
END SEMESTER EXAM DURATION	3 hrs.
LAST REVISION DATE	

INSTRUCTIONS: The Question paper will consist of seven questions distributed over three sections A, B and C. Section A comprises of very short answer type questions and is compulsory. Section B & C comprise of short answer type and long answer type questions. These sections will have internal choice

OBJECTIVES:

1. Define the stress, strains and their relation in detail.
2. To apply different compatible equations to solve cantilever and simply supported beam problems.
3. To understand the two dimensional elasticity problems.
4. To understand the torsion in straight bars.

LEARNING OUTCOMES:

1. Ability to understand the basic concepts in continuum mechanics of solids, including of strain, internal force, stress and equilibrium in solids.
2. Ability to use analytical techniques to predict deformation, internal force and failure of simple solids and structural components.
3. Ability to apply principles of continuum mechanics to design a structure or component to achieve desired performance under realistic constraints.

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MODULE CONTENT:

Unit-I: Concept of stress State of stress at a point; Stress notations; State of strain at a point and notations; States of plane stress and plane strain; Hooke's law and generalized statement of Hooke's law; Stress-strain relationships; Concept of principal stress and strain; Mohr's circle.
Unit-II: Cantilevers and beams Compatibility equations; Stress function; Use of stress function in solution of two dimensional problems in Cartesian coordinates; Boundary conditions; Problems of cantilever; Supported beam under distributed load of uniform and uniformly variable intensity; Use of Fourier series.
Unit-III: Two dimensional problems Two dimensional elasticity problems in polar coordinates; Equation of equilibrium; Axi-symmetric problems; Thick cylinder; Curved bars; Hole in a plate problem; Idea of an edge dislocation.
Unit-IV: Torsion Torsion of straight bars; Elliptic and circular section; Membrane analogy; Torsion of thin rectangular section; Application of energy method to torsion problem; Torsion of thin tubes.
Unit-V : Complex analysis Complex variables for curvilinear coordinates; Laplace's equation; Complex stress function and corresponding displacements; Curvilinear coordinates and stress components; Elliptic hole in a uniformly stressed plate.
Unit-VI: Waves and vibrations Propagation of waves in elastic solid media; Use of elastic waves; Wave equation; Time harmonic solution,; Boundary conditions; Reflection and rarefaction; Rayleigh waves; Vibration of rods and plates.

RECOMMENDED BOOKS:

TEXT BOOKS	1. Theory of Elasticity: S P Timoshenko McGraw-Hill International, New York
REFERENCE BOOKS	1. Applied Elasticity: Zhilun Xu Wiley Eastern Ltd, New Delhi 2. Applied Elasticity: Chi-Teh Wan McGraw-Hill, New York

METHODS OF TEACHING AND STUDENT LEARNING

The subject is delivered through lectures, on-line support, text book / course material reading and practical exercises. Some videos will be shown to demonstrate certain concepts and research areas will be discussed. Resource material is provided with the help of PDM Educational Directory Services (PEDS).

ASSESSMENT METHODOLOGIES:

This subject will be evaluated for a total of 150 marks for theory

Theory:

Assessment #	Type Of Assessment	Per Semester	Maximum Mark
1.	Class Test	4	10
2.	Sessional Test	2	30
3.	Group Discussion	4	10
4.	End Semester Exam	1	100

MAPPING OF ASSESSMENT METHODS AGAINST THE LEARNING OUTCOMES

Theory:

Assessments	1	2	3
Class Test	x	x	
Quiz		x	x
Assignment	x		

MAPPING OF COURSE LEARNING OUTCOMES

Program Outcomes	a	b	c	D	e	f	g	h	i	j	k
Course Learning Outcomes	3		2,3		1	3		3		2	

EVALUATION

At the end of semester, course faculty will submit an evaluation / review report. The purpose of this report is to identify aspects that will be highlighted by students and faculty's feedback for the course with respect to its strengths as well as those areas which could be improved. The review report contains the following areas:

- Problems encountered in the content delivery;
- Suggested remedies / corrective measures;
- Approved refinement decisions due for implementation;
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PDM UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING

SEMESTER - IV

MODULE CODE	CATEGORY	MODULE	L	T	P	C	Internal	External	Total Marks
CIVL6107	DI	DISSERTATION and VIVA (DISSERTATION STAGE 2)	-	-	-	10	250	250	500
TOTAL CREDITS			**0**	**0**	**0**	**10**	250	250	500

L = Lecture

T = Tutorial

P = Practical

C = Credit Point

***Students have to publish a research paper in a journal / conference of the research work done in the semester.**