

APPENDIX - I
M. Tech. PROGRAM,
REVISED COURSE STRUCTURE – C25

Pre - Semester

Course Code	Title of the course	L	T	P	SL	C	Course type
25SAB101	Orientation Session	0	2	0	0	1	Binary graded
25AMB101	IT workshop and cyber security	0	0	2	0	1	Binary graded
	Total	0	2	2	0	2	

I Year I Semester

Course Code	Title of the course	L	T	P	SL	C	Course type
25SEB101	Theory of Elasticity and Plasticity	3	2	0	3	4	Professional Core
25SEB102	Design of Reinforced Concrete for Industrial Applications	2	2	2	2	4	Professional Core
25SEB103	Design and Behaviour of Pre-Engineered Building Systems	3	2	0	3	4	Professional Core
	Department Elective - I	3	2	0	3	4	Elective
25SEB104	Teaching Assistantship	0	0	2	0	1	Binary graded
25ENB101	Indian Knowledge System	0	2	0	0	1	Binary graded
	Work-in-lieu of a course*					2	Elective & Floating Credit
	Sub Total	11	10	4	11	20	
	Add on course -I					3	
	Total	11	10	4	11	23	

I Year II Semester

Course Code	Title of the course	L	T	P	SL	C	Course type
25SEB105	Structural Dynamics	2	2	2	3	4	Professional Core
25SEB106	Finite Element Analysis of Structures	3	2	0	2	4	Professional Core
	Department Elective - 2	3	2	0	3	4	Elective
	Department Elective - 3	3	2	0	3	4	Elective
25MSB101	Research Methodology & IPR	1	2	0	1	2	Interdisciplinary
25SEB107	Interdepartmental Project	0	0	2	0	1	Project
25SEB108	Teaching Assistantship	0	0	2	0	1	Binary graded
	Sub Total	12	10	6	12	20	
	Add on course -2					3	
	Total	12	10	6	12	23	

II Year I Semester

Course Code	Title of the course	L	T	P	SL	C	Course type
25SEB201/ 25SEB202	Project/Internship	0	2	24	0	13	Project
	Sub Total	0	2	24	0	13	
	Add on course -3 (MOOCs Course)					3	
	Total	0	2	24	0	16	

II Year II Semester

Course Code	Title of the course	L	T	P	SL	C	Course type
25SEB203/ 25SEB204	Project/Internship	0	2	24	0	13	Project
	Sub Total	0	2	24	0	13	
	Add on course -4 (MOOCs Course)					3	
	Total	0	2	24	0	16	

Department Electives

Course Code	Title of the course	L	T	P	SL	C
25SEB801	Structural Optimisation	3	2	0	3	4
25SEB802	Earthquake Resistant Design of Structures	3	2	0	3	4
25SEB803	Advanced Concrete Technology	2	2	2	2	4
25SEB804	Bridge Engineering	3	2	0	3	4
25SEB805	Advance Foundation Engineering	3	2	0	3	4
25SEB806	Advanced Steel Structural Design	3	2	0	3	4
25SEB807	Repair and Rehabilitation of Structures	3	2	0	3	4

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APPENDIX - II

List of Courses that Enables Employability or Entrepreneurship or Skill Development

S. No.	Course Code	Course Title	Year of Introduction	Employability / Entrepreneurship / Skill Development
1	25SEB101	Theory of Elasticity and Plasticity	2025	Skill development: This course builds strong analytical and mathematical foundations in elasticity, tensor analysis, and energy methods essential for advanced structural analysis, computational mechanics, and higher studies. It enhances problem-solving skills required for core engineering roles, research, and design-based industries. Employability & Skill Development: The course strengthens industry-ready competencies through codal-based industrial RCC design, seismic analysis, machine foundation design, and hands-on use of professional software such as STAAD.Pro, ETABS, and AutoCAD, thereby enhancing graduates' immediate employability in infrastructure, EPC, and industrial construction sectors while building advanced structural engineering skills.
2	25SEB102	Design of Reinforced Concrete for Industrial Applications	2025	Skill development, Employability & Entrepreneurship: It provides industry-oriented hands-on training in Pre-Engineered Building (PEB) design, crane systems, software-based modelling, optimization, detailing, and construction practices directly aligned with current industrial requirements.
3	25SEB103	Design and Behaviour of Pre-Engineered Building Systems	2025	Employability: The course prepares students for professional roles in structural design and analysis by imparting practical optimization techniques and computational skills used in industry and research.
4	25SEB105	Structural Dynamics	2025	

5	25SEB106	Finite Element Analysis of Structures	2025	<p>Employability: This syllabus equips students with industry-relevant structural analysis and finite element modelling skills aligned with professional design codes, directly preparing them for roles in structural design and analysis.</p> <p>Employability: The course equips students with analytical and computational optimisation techniques widely used in structural design, analysis, and software-driven engineering practice. These skills directly enhance job readiness in design consultancies, infrastructure firms, and R&D roles rather than focusing on venture creation.</p>
6	25SEB801	Structural Optimisation	2025	<p>Skill development: The course develops professional competencies in seismic analysis, code-based design, and ductile detailing as per IS 1893 and IS 13920, which are essential for structural design and consultancy roles. It directly enhances structural readiness for careers in earthquake engineering, infrastructure design, and safety-critical construction projects.</p> <p>Skill development & Employability: This syllabus develops industry-ready expertise in advanced, special, and sustainable concrete technologies—directly aligning with professional roles in construction, materials testing, quality control, and infrastructure development.</p> <p>Employability:The Bridge Engineering course primarily strengthens employability by equipping students with practical competencies in bridge analysis, design, and interpretation of IRC codes.</p> <p>Employability & Skill Development: The syllabus equips students with cutting-edge, practice-oriented geotechnical skills—advanced soil behavior, practice-oriented geotechnical ground modelling, smart foundation design, and performance monitoring—directly aligned with industry requirements for geotechnical engineers, foundation specialists, and infrastructure consultants.</p>
7	25SEB802	Earthquake Resistant Design of Structures	2025	
8	25SEB803	Advanced Concrete Technology	2025	
9	25SEB804	Bridge Engineering	2025	
10	25SEB805	Advance Foundation Engineering	2025	

11	25SEBR06	Advanced Steel Structural Design	2025	<p>Employability & Skill Development: The course develops industry-ready competencies through advanced steel member design, tower and chimney analysis, composite construction, fatigue assessment, and extensive use of professional software such as STAAD Pro, ETABS, and Tekla, thereby directly enhancing graduate employability in structural consulting firms, EPC companies, fabrication industries, and infrastructure projects while simultaneously strengthening advanced structural engineering skills.</p>
12	25SEBR07	Repair and Rehabilitation of Structures	2025	<p>Employability: The course develops industry-oriented competencies in condition assessment, non-destructive testing, material selection, and repair strategies, which are essential for professional practice in structural consultancy and infrastructure maintenance. These skills directly enhance job readiness in construction, quality assurance, and structural rehabilitation projects.</p>

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APPENDIX - III

Comparison of Course Contents between R25-C25 and R22-C22/C24 Curriculums

S. No.	Course Code	Course Title	% of Changes	Justification for Changes
1	25SEB101	Theory of Elasticity and Plasticity	20%	Introduced by incorporating advanced tensor concepts, energy theorems, and variational principles. These changes strengthen analytical depth, modern elasticity formulation, and alignment with higher studies and industry-oriented computational analysis.
2	25SEB102	Design of Reinforced Concrete for Industrial Applications	100%	The course Design of Reinforced Concrete for Industrial Applications has been completely revised to align with rapid advancements in industrial construction practices, updated design codes, automation-driven construction methods, and emerging requirements such as durability-based design, sustainability, prefabrication, and performance-oriented industrial structures, ensuring graduates are fully equipped for contemporary industry needs and enhanced employability.

3	25SEB103	Design and Behaviour of Pre-Engineered Building Systems	100%	<p>To address the growing industry demand for specialized expertise in Pre-Engineered Buildings (PEB), which are widely adopted in industrial, commercial, and infrastructure projects. The course equips postgraduate students with advanced knowledge of cold-formed steel behavior, crane systems, mezzanine structures, software-based analysis, optimization techniques, and practical detailing, thereby bridging the gap between conventional structural design education and modern industrial construction practices.</p>
4	25SEB105	Structural Dynamics	20%	<p>To strengthen vibration analysis concepts by incorporating practical computation of dynamic responses, response spectrum interpretation, and multi-degree-of-freedom system analysis, thereby aligning the course with modern structural dynamics practice and industry expectations.</p>
5	25SEB106	Finite Element Analysis of Structures	20%	<p>To incorporate advanced finite element formulation, hands-on analytical practices, and current code-based applications, ensuring alignment with modern industry requirements and improving graduate employability in structural analysis and design roles.</p>
6	25SEB801	Structural Optimisation	25%	<p>The syllabus has been modified to incorporate advanced optimisation techniques, multivariable and constrained problem formulations, and practical structural engineering applications. These enhancements align the course with current industry practices and computational tools, thereby improving students' analytical capability, design efficiency, and employability in structural engineering and allied domains.</p>

7	23SEB802	Earthquake Resistant Design of Structures	25%	<p>The syllabus has been modified by approximately 25% to incorporate advanced seismic analysis methods, ductility-based design philosophy, and base isolation concepts in line with current IS codes and professional practice. These updates strengthen practical design skills, code compliance, and industry relevance, thereby enhancing graduates' employability in earthquake-resistant structural design and consultancy.</p>
8	23SEB803	Advanced Concrete Technology	25%	<p>To incorporate emerging and industry-relevant concrete technologies, including sustainable and low-carbon concretes, geopolymer concrete, recycled aggregate concrete, self-healing concrete, 3D printed concrete, advanced admixtures, and enhanced durability and non-destructive testing methods, ensuring alignment with current construction practices, sustainability goals, and employability requirements.</p>
9	23SEB804	Bridge Engineering	35%	<p>Module-1: Covers fundamentals of bridge engineering including classification of bridges, site investigation, economic span selection, loading standards (IRC and railway loads), impact factors, and analysis and design of bridge substructures and slab bridge superstructures.</p> <p>Module-2: Focuses on advanced bridge design covering T-beam bridge superstructures using standard load distribution methods, design of longitudinal girders, bearings and expansion joints, and practical exposure to IRC code provisions and modern bridge design practices.*</p>

10	25SEB805	Advance Foundation Engineering	25%	To integrate advanced and emerging geotechnical engineering practices, including Critical State Soil Mechanics for foundations, probabilistic and reliability-based soil parameter assessment, smart and AI-enabled site investigation techniques, 3D digital ground modelling, advanced shallow and deep foundation design under cyclic and seismic loading, sustainable ground improvement methods, bio-mediated soil stabilization (MICP), and smart foundation monitoring using IoT and digital twins, ensuring strong alignment with current industry practices, sustainability needs, and enhanced employability.
11	25SEB806	Advanced Steel Structural Design	100%	New Course The syllabus has been modified to incorporate advanced non-destructive testing techniques, contemporary repair materials, and sustainable rehabilitation strategies aligned with current codes and industry practices. These updates strengthen practical exposure, diagnostic skills, and professional competence required for modern structural maintenance and rehabilitation works.
12	25SEB807	Repair and Rehabilitation of Structures	20%	

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APPENDIX - IV

List of New Courses in the R25-CT5 Curriculum

S. No.	Course Code	Course Title	% of Changes	Justification for Changes
1	25SEB101	Theory of Elasticity and Plasticity	20%	Introduced by incorporating advanced tensor concepts, energy theorems, and variational principles. These changes strengthen analytical depth, modern elasticity formulation, and alignment with higher studies and industry-oriented computational analysis.
2	25SEB102	Design of Reinforced Concrete for Industrial Applications	100%	The course Design of Reinforced Concrete for Industrial Applications has been completely revised to align with rapid advancements in industrial construction practices, updated design codes, automation-driven construction methods, and emerging requirements such as durability-based design, sustainability, prefabrication, and performance-oriented industrial structures, ensuring graduates are fully equipped for contemporary industry needs and enhanced employability.

3	25SEB103	Design and Behaviour of Pre-Engineered Building Systems	100%	To address the growing industry demand for specialized expertise in Pre-Engineered Buildings (PEB), which are widely adopted in industrial, commercial, and infrastructure projects. The course equips postgraduate students with advanced knowledge of cold-formed steel behavior, crane systems, mezzanine structures, software-based analysis, optimization techniques, and practical detailing, thereby bridging the gap between conventional structural design education and modern industrial construction practices.
4	25SEB105	Structural Dynamics	20%	To strengthen vibration analysis concepts by incorporating practical computation of dynamic responses, response spectrum interpretation, and multi-degree-of-freedom system analysis, thereby aligning the course with modern structural dynamics practice and industry expectations.
5	25SEB106	Finite Element Analysis of Structures	20%	To incorporate advanced finite element formulation, hands-on analytical practice, and current code-based applications, ensuring alignment with modern industry requirements and improving graduate employability in structural analysis and design roles.
6	25SEB801	Structural Optimisation	25%	To incorporate advanced optimisation techniques, multivariable and constrained problem formulations, and practical structural engineering applications. These enhancements align the course with current industry practices and computational tools, thereby improving students' analytical capability, design efficiency, and employability in structural engineering and allied domains.

7	25SEB802	Earthquake Resistant Design of Structures	25%	<p>To incorporate advanced seismic analysis methods, ductility-based design philosophy, and base isolation concepts in line with current IS codes and professional practice. These updates strengthen practical design skills, code compliance, and industry relevance, thereby enhancing graduates' employability in earthquake-resistant structural design and consultancy.</p>
8	25SEB803	Advanced Concrete Technology	25%	<p>To incorporate emerging and industry-relevant concrete technologies, including sustainable and low-carbon concretes, geopolymer concrete, recycled aggregate concrete, self-healing concrete, 3D printed concrete, advanced admixtures, and enhanced durability and non-destructive testing methods, ensuring alignment with current construction practices, sustainability goals, and employability requirements.</p>
10	25SEB805	Advance Foundation Engineering	25%	<p>To integrate advanced and emerging geotechnical engineering practices, including Critical State Soil Mechanics for Foundations, probabilistic and reliability-based soil parameter assessment, smart and AI-enabled site investigation techniques, 3D digital ground modeling, advanced shallow and deep foundation design under cyclic and seismic loading, sustainable ground improvement methods, bio-mediated soil stabilization (MIC/P), and smart foundation monitoring using IoT and digital twins, ensuring strong alignment with current industry practices, sustainability needs, and enhanced employability.</p>
11	25SEB806	Advanced Steel Structural Design	100%	<p>New Course</p>

12	25SEB807	Repair and Rehabilitation of Structures	20%	The syllabus has been modified to incorporate advanced non-destructive testing techniques, contemporary repair materials, and sustainable rehabilitation strategies aligned with current codes and industry practices. These updates strengthen practical exposure, diagnostic skills, and professional competence required for modern structural maintenance and rehabilitation works.
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APPENDIX - V

List of Courses in the B25-C25 Curriculum Incorporating IKS

S. No	Course Code	Course Title	Type of Course	Module (Unit)	IKS Components Incorporated
1	25SEB101	Theory of Elasticity and Plasticity	Mandatory	M1 (U1&U2) M2 (U1, U2 & U3)	Concepts such as stress-strain behavior, equilibrium, compatibility, energy principles, and superposition align with traditional Indian understandings of balance (Samya), structural stability, material response, and energy-based reasoning seen in ancient Indian architectural and mechanical practices (e.g., <i>Yatru Samra</i> and <i>Shiv Samra</i>).
2	25SEB102	Design of Reinforced Concrete for Industrial Applications	Mandatory	M1 (U1&U2) M2 (U1, U2 & U3)	Module 1 integrates Indian engineering knowledge through the use of national codal provisions (IS 456, IS 875, IS 1891, IS 3370, IS 2974) developed from indigenous research, Indian climatic-seismic conditions, material behavior studies, and long-term performance of industrial structures across the country.
3	25SEB103	Design and Behaviour of Pre-Engineered Building Systems	Mandatory	M1 (U1&U2) M2 (U1, U2 & U3)	Ancient Indian structural wisdom in temple halls, mandapas, and iron pillar design Ancient lifting and material handling devices (yatraks, pulley systems) Minimum-material philosophy in traditional Indian construction
4	25SEB105	Structural Dynamics	Mandatory	M1 (U1&U2) M2 (U1, U2 & U3)	N/A

5	23SEEB106	Finite Element Analysis of Structures	Mandatory	M1 (U1&U2) M2 (U1, U2 & U3)	NA
6	23SEEB801	Structural Optimisation	Department Elective	M1 (U1&U2) M2 (U1, U2 & U3)	Incorporation of traditional Indian structural design philosophies—such as optimal material usage, geometric proportioning, and load-path efficiency observed in ancient temples, stupae, and stone bridges—as illustrative examples while teaching optimisation concepts like objective functions and constraints.
7	23SEEB802	Earthquake Resistant Design of Structures	Department Elective	M1 (U1&U2) M2 (U1, U2 & U3)	Study of earthquake-resistant features in traditional Indian constructions such as timber-based masonry (Kash-Kuan, Dhauj-Dawan), stone temples, and stepped structures, highlighting inherent ductility, energy dissipation, and redundancy concepts.
8	23SEEB803	Advanced Concrete Technology	Department Elective	M1 (U1&U2) M2 (U1, U2 & U3)	Traditional lime-based binders and indigenous material knowledge – Compressive strength and supplementary cementitious materials
9	23SEEB804	Bridge Engineering	Department Elective	M1 (U1 & U2) M2 (U1, U2 & U3)	This module integrates Indian Knowledge Systems by introducing traditional Indian bridge planning and construction practices. Ancient stone and wooden bridges reflect indigenous understanding of site investigation, span selection, and load transfer using local materials. This module incorporates IKS through ancient Indian concepts of load paths, structural balance, and movement accommodation. Traditional cantilevered and beam-based bridges illustrate early principles of load distribution and bearing behavior. Indigenous practices emphasize durability, use of local materials, and sustainability in bridge engineering.
10	23SEEB805	Advance Foundation Engineering	Department Elective	M1 (U1&U2) M2 (U1, U2 & U3)	The syllabus aligns with indigenous Indian knowledge systems that emphasized empirical soil assessment, ground suitability, and stable foundation practices in traditional architecture, now extended through modern testing, digital modelling, and monitoring techniques.

11	24SEB806	Advanced Steel Structural Design	Mandatory	M1 (U1&U2) M2 (U1, U2 & U3)	Module 1 integrates Indian engineering knowledge through the application of national steel design codes (IS 800, IS 813, IS 1891, IS 802, IS 6533) developed from indigenous research on Indian climate conditions, seismicity, fatigue performance, corrosion environments, and long-term behaviour of towers, chimneys, and industrial steel structures. Module 2 embeds IKS through Indian bridge and composite construction standards (IRS provisions, IS 11384, IS 801, IS 811), fabrication and connection-detailing practices evolved in Indian steel industries, and research-driven cold-chamber approaches for cold-formed sections, fatigue-resistant girders, and ductile composite systems under Indian service conditions.
12	24SEB807	Repair and Rehabilitation of Structures	Department Elective	M1 (U1&U2) M2 (U1, U2 & U3)	Study of durability and longevity principles observed in traditional Indian structures such as ancient temples, stupas, forts, and lime-mudh masonry; focusing on natural materials, construction detailing, and maintenance practices that enhanced resistance to weathering and environmental degradation.

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APPENDIX - VI

List of Courses in the R25-C25 Curriculum Incorporating IKS

S.No	Course Code	Course Title	Type of Course	SDGs Covered	Justification
1	25SEB101	Theory of Elasticity and Plasticity	Mandatory	9	Fundamentals of stress, strain, equilibrium, and constitutive relations ensure safe and reliable design of infrastructure systems.
				11	Analysis of stress distribution, cantilevers, curved beams, and plates supports safe structural components used in buildings and urban infrastructure.
				12	Energy methods and uniqueness theorems promote optimized structural design, minimizing material usage and resource wastage.
				4	Tensor formulation enhances advanced mathematical understanding and analytical rigor essential for higher engineering education and research.
				9	Promotes resilient industrial facilities through advanced RCC design, seismic detailing, machine foundations, and software-based structural analysis.
11	Ensures safe and disaster-resistant industrial buildings using codal seismic, fire-resistant, and durability-based design approaches.				

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2	25SEB102	Design of Reinforced Concrete for Industrial Applications	Mandatory	12	Encourages material-efficient RCC design, optimized structural systems, and durability concepts that reduce resource use and lifecycle costs.
				13	Addresses climate-responsive infrastructure through thermal stress design, extreme load considerations, and earthquake-resilient RCC systems.
3	25SEB103	Design and Behaviour of Pre-Engineered Building Systems	Mandatory	9	Promotes modern, industrialized construction systems.
				11	Structural systems for sustainable industrial and urban buildings.
				12	Efficient use of materials and reduction of construction waste.
4	25SEB105	Structural Dynamics	Mandatory	9	In structural dynamics and vibration analysis essential for the design of safe, resilient, and reliable infrastructure and machinery foundations, supporting sustainable industrial and infrastructure development.
5	25SEB106	Finite Element Analysis of Structures	Mandatory	9	Capabilities in advanced structural analysis and finite element methods, supporting the design of safe, efficient, and innovative infrastructure systems essential for sustainable industrial and infrastructural development.
6	25SEB01	Structural Optimization	Department Elective	9	Structural optimization directly supports resilient, efficient, and innovative infrastructure development through advanced design and computational techniques.
7	25SEB02	Earthquake Resistant Design of Structures	Department Elective	11	The course focuses on earthquake-resilient and safe building design, directly contributing to disaster-resilient, sustainable, and safe urban infrastructure.

8	25SEB803	Advanced Concrete Technology	Department Elective	9	Advanced and special concretes enhance the performance, durability, and innovation of infrastructure systems.
				12	Promotes efficient resource utilization and reduction of construction waste through sustainable material practices.
				13	Reduces carbon emissions associated with cement production, supporting climate-resilient construction.
9	25SEB804	Bridge Engineering	Department Elective	9	The course focuses on planning, analysis, and design of bridges using IRC codes, modern load distribution methods, and advanced bearings, supporting safe, resilient, and innovative infrastructure development.
				11	Bridge design emphasizes durability, serviceability, and efficient connectivity, contributing to sustainable transport networks and improved accessibility in urban and rural communities.
				13	Concepts of load effects, durability, expansion joints, and bearings address environmental impacts, temperature variations, and resilience of bridges under changing climatic conditions.
10	25SEB805	Advance Foundation Engineering	Department Elective	9	Promotes innovation, resilience, and reliability in infrastructure through advanced geotechnical design and monitoring technologies.
				11	Supports safe, resilient, and sustainable urban development by improving foundation performance and ground stability.

11	25SEB806	Advanced Steel Structural Design	Mandatory	Encourages resource efficiency and sustainable material use in foundation engineering. Supports resilient and efficient infrastructure through advanced steel design of towers, chimneys, plate girders, composite systems, and long-span industrial structures. Promotes disaster-resilient urban and industrial buildings using wind- and seismic-resistant steel systems and code safety-based detailing.
12	25SEB807	Repair and Rehabilitation of Structures	Department Elective	Encourages optimized steel usage, fatigue-resistant detailing, and composite construction for reduced material consumption and improved lifecycle performance. Addresses climate-responsive infrastructure through wind engineering, thermal stress evaluation, corrosion protection, and seismic-resistant structural systems. The course emphasizes extending service life and optimizing use of materials through repair strategies, thereby reducing resource consumption and construction waste.
9				Encourages resource efficiency and sustainable material use in foundation engineering. Supports resilient and efficient infrastructure through advanced steel design of towers, chimneys, plate girders, composite systems, and long-span industrial structures.
11				Promotes disaster-resilient urban and industrial buildings using wind- and seismic-resistant steel systems and code safety-based detailing.
12				Encourages optimized steel usage, fatigue-resistant detailing, and composite construction for reduced material consumption and improved lifecycle performance.
13				Addresses climate-responsive infrastructure through wind engineering, thermal stress evaluation, corrosion protection, and seismic-resistant structural systems.
12				The course emphasizes extending service life and optimizing use of materials through repair strategies, thereby reducing resource consumption and construction waste.

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APPENDIX VII

Action Taken Report (ATR) on the suggestions given in earlier BoS meetings

S. No.	Action Point	Response
1	Need to strengthen advanced theoretical foundation in structural engineering	Core courses such as Theory of Elasticity and Plasticity, Structural Dynamics, and Finite Element Analysis of Structures have been included to provide strong analytical and mathematical foundations required for advanced structural research and design.
2	Limited exposure to industry-oriented structural design practices	Design of Reinforced Concrete for Industrial Applications and Design and Behaviour of Pre-Engineered Building Systems have been introduced to address real-world industrial structures, large-span systems, and modern construction practices.
3	Emphasis on outcome-based education and employability	The revised course structure balances theory, tutorials, practicals, seminars, and projects, ensuring improved employability, analytical competence, and readiness for professional practice.
4	Insufficient computational and numerical analysis skills	Finite Element Analysis of Structures has been included as a core course to enhance numerical modelling, simulation, and computational analysis skills essential for industry and research.


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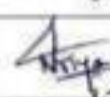
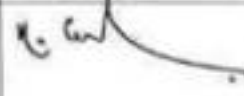

Minutes of Board of Studies Meeting

Board of Studies (BoS) meeting for the B. Tech programme was conducted on 29.03.2025 in a blended mode from 10:00 A.M to 05:00 P.M. The physical meeting will be held at U-Block, Ground Floor, (AGF-06), while the online session can be accessed via the following link Mr. K. Bala Gopi Krishna: Scheduled a meeting. All members are kindly requested to make it convenient to attend the meeting.

Agenda of the BoS Meeting:

1. Discussion and finalization of the curriculum structure, credit distribution, and L-T-P-SL components for the R25-C25 regulation.
2. Review and verification of the detailed syllabus, CO-PO mapping, SDG & IKS mapping for core and elective courses in the B. Tech Civil Engineering programme.
3. Minor and Honour streams, including a review of their respective courses and detailed syllabus.
4. Pattern of Formative and Summative assessment for R25-C25.
5. Consideration and Discussions on incorporation of emerging technologies, interdisciplinary courses, industry-aligned courses, internships, and skill development programmes for students to enhance the curriculum.
6. Discussion on any other points with the permission of the Chair

The following members were present either through offline or online.

Sl. No	Name of the member	Position	Signature
1	Dr. M. Ramakrishna Professor Dean, School of Core Engineering	Chair-Person	
2	Dr. P. Sundara Kumar Head & Associate Professor	Internal Member	
3	Dr. Subhasish Dey Distinguished Professor, IIT Jodhpur	External Member (Academia)	- Attended online -
4	Ms. Ch. Naga Priyanka Manager-Civil Larsen & Toubro Pvt. Ltd.,	External Member (Industry)	
5	Dr. K. Srinivasa Rao Professor, Andhra University	Invited Member (Research)	
6	Mr. Y. R. Nagaraja Managing Director Ramky Infrastructure Limited	Invited Member (Industry)	- Absent -
7	Dr. M. Karthikeyan Professor	Internal Member	

8	Dr. P. Parthiban Assistant Professor	Internal Member	P. Parthiban
9	Dr. Payel Chaudhuri Assistant Professor	Internal Member	Payel Chaudhuri
10	Dr. J. Gopala Rao Assistant Professor	Internal Member (Dean R&D Nominee)	J. Gopala Rao
11	Dr. A. V. A. Bharat Kumar Assistant Professor	Internal Member (School Dean Nominee)	A. V. A. Bharat Kumar
12	Dr. P. Rakesh Assistant Professor	Internal Member	- Attended Online -
13	Mr. M. Anirudh Assistant Professor	Internal Member	Anirudh. M
14	Mr. D. Ravikanth Assistant Professor	Internal Member	D. Ravikanth
15	Mr. K. Bala Gopi Krishna Assistant Professor	Member Secretary	K. Bala Gopi Krishna

The following members have taken leave of absence:

1. Mr. Y. R. Nagaraja, Managing Director, Ramky Infrastructure Limited.

Chairperson Dr. M. Rama Krishna, Professor and Dean – School of Core Engineering, VFSTR initiated the meeting by welcoming and introducing the external members and invitees to the internal members. Head of the Department Dr. P. Sundara Kumar, Associate Professor, presented about the NEP 2020 Compliant Regulation - R25-C25 which emphasis on creating learning centric (continuous learning and continuous assessment model), offering B. Tech., B. Tech. with Honours / Research Honours / Minor / Add-on Diploma, providing lateral entry and honourable exit. The Secretary of Board of Studies, Mr. K. Bala Gopi Krishna, Assistant Professor, presented about the R25 Regulation, Course Structure, Assessment Patterns and the syllabus of all the courses.

The following points were discussed in the BoS meeting:

1. Regulation R25-C25.
2. Curriculum structure with credits, credits distribution (L-T-P-SL).
3. Significance of self-learning (SL).
4. 2 Modules, Module-1 is fundamental with 2 units and Module-2 is with 3 units.
5. Assessment methods (Formative & Summative).
6. Grading Schemes.
7. Department Elective and Honour courses (streams/pools).

8. Open Elective and Minor courses (streams/pools).
9. Information related to NPTEL courses for the Academic Year 2025-26.
10. Creative work-in-Liu-Course work
11. SDG Mapping and incorporation of IKS components
12. Consideration of new program outcomes (POs) as prescribed by the NBA

The following are the observations:

1. Major restructuring has taken place in the curriculum which is oriented towards continuous learning and assessment based on Module structure.
2. Major reformation has taken place in the curriculum by offering Honours/Specialization degree or Minor degree through 16 more credits with additional courses.
3. R25-C25 curriculum structure including list of professional core, department elective, open elective, Minor, Honour, NPTEL courses of B. Tech in Civil Engineering programme & M. Tech in Structural Engineering Structural Engineering in **Appendix - I**
4. The curriculum is encompassing the courses that enable employability or entrepreneurship or skill development, provided in **Appendix - II**.
5. Total average percentage of syllabus revised was **65.46%** for B. Tech & **41.67%** for M. Tech compared to previous curriculum provided in **Appendix - III**.
6. The significant changes are made in the content of all courses and hence the courses are considered as new courses provided in **Appendix - IV**.
7. **Indian Knowledge System (IKS)** components are incorporated in the relevant courses and the details are mentioned in **Appendix - V**.
8. The courses in the curricula are mapped with the **Sustainable Development Goals (SDG)** and the mapping details are provided in **Appendix - VI**.
9. Feedback from various stakeholders are incorporated appropriately in the R25-C25 curriculum.
10. New core courses, department electives, open electives, honors have been introduced in this regulation of R25-C25.
11. Information on NPTEL course offerings for the 2025-26 academic year, for B. Tech students in Civil Engineering.

S. No	Course Title	Credits
1	Urban Utilities Planning: Water Supply, Sanitation and Drainage	3
2	Organizational Behaviour	3
3	Industrial Safety Engineering	3
4	Project Management for Managers	3
5	Environment and Development	3
6	Sustainable Transportation Systems	3
7	Geosynthetics and Reinforced Soil Structures	3
8	Ground Improvement	3

The following improvements are suggested: (Action Points)

1. It was recommended to add a Lab component to the Strength of Materials course as a practice-based element to provide hands-on experience and reinforce the theoretical concepts through practical application.
2. It was proposed to consider mainly on focusing Detailing and Drafting in the Design of Reinforced Concrete Structures course.
3. The BoS members suggested introducing a Structural Computational Lab in Semester III-II, utilizing software tools such as STAAD. Pro or ETABS.
4. The industry expert raised a concern regarding the absence of Construction and Project Management in the Professional Core courses. It was strongly recommended to include this course as a mandatory core subject, along with a Lab component utilizing PRIMAVERA software to equip students with essential project planning and management skills relevant to industry practices.
5. It was suggested to include a module on Professional Ethics as part of the Engineering Orientation Program, to instill ethical awareness and responsibility among students from the outset of their academic journey.
6. The experts suggested considering the inclusion of binary graded courses such as Laws, Human Rights, and Finance, based on students' interest.
7. It was recommended to modify the course title of "Advanced Hydraulics" and "Advanced Reinforced Concrete Design" to "Hydraulics and Hydraulic Machines" & "Advanced Structural Design" in the elective courses list, to better reflect the course content and align with industry terminology.

8. A new course titled "Modern Approaches in Pre-Engineered Building Systems" was discussed in the Board of Studies meeting, and the Board suggested a few minor modifications to the course content, which were accepted for incorporation.
9. In the Honours stream of Structural Engineering, the following modifications were recommended:
 - ✓ Change the course title from "Design of Underground Water Structures" to "Design of Liquid Retaining Structures" for better alignment with course content.
 - ✓ Replace the course "Finite Element Analysis" with a new course on "Green Buildings" to introduce students to sustainable structural design practices.
10. In the Honors stream of Transportation Engineering, it was recommended to modify the course title "Road Safety" to a more comprehensive and updated title.
11. In the Building Materials and Construction Technology (BMCT) syllabus, the following revisions were recommended:
 - ✓ Include Bricks, Tiles, Glass, Timber, and Steel in Module-1 to broaden the coverage of traditional and modern construction materials.
 - ✓ Elaborate the names of tests in the practice components of Module-1 and Module-2 for clarity and standardization.
 - ✓ Add the Silt Content Test for fine aggregates in the list of tests.
 - ✓ Modify the title of Module-2, Unit-2 to "Special Concrete" to better reflect the focus of the content.
 - ✓ Interchange the text book authors of 1 and 2 to improve the logical flow and sequencing of topics.
12. In the Strength of Materials course, the following revisions were recommended:
 - ✓ Include the relationship between stress and strain explicitly in the syllabus.
 - ✓ Add the complete derivation of both the Flexure Formula and the Torsional Formula for thorough conceptual understanding.
13. Update the textbooks as follows:
 - Add:
 - Engineering Mechanics of Solids by Popov, P.
 - Elements of Strength of Materials by S.P. Timoshenko and D.H. Young (Will Young)
 - Remove:
 - R.K. Bansal
 - Bhavikatti

14. Swap Unit-2 of Module-1 with Unit-3 of Module-2 to improve content flow and alignment of topics.
15. In the Transportation Engineering course, it was recommended to add a case study related to high-speed test drives or similar practical scenarios. This will allow students to understand real-world challenges and engineering solutions in high-speed transportation systems.
16. In the Environmental Engineering course, it was recommended to add 2-3 reference books for comprehensive study.
17. In the Structural Analysis course, the following revisions were recommended:
 - ✓ Review and update the unit names for both Module-1 and Module-2 to ensure clarity and better alignment with course objectives.
 - ✓ Specify the topics related to Single Storey Single Frame and the Determination of Pin-Jointed Frames for better focus.
 - ✓ Include the textbook Structural Analysis by C.K. Wang as a reference for comprehensive study and understanding.
18. It was recommended to include residential building plans for both a Two-Storey Building and a Duplex Building in the syllabus. This will provide students with practical knowledge and experience in architectural design and layout for residential structures.
19. In the Design of Reinforced Concrete Structures course, the following revisions were recommended:
 - ✓ In Module-1, specify the codes IS 875 Part 1 & 2 for better understanding of design loads and structural safety.
 - ✓ In Module-2, Unit-3, add the types of footing, specifically focusing on Isolated Footing and Combined Footing (Two Columns) to enhance students' understanding of foundation design.
 - ✓ Include the textbook Design of Reinforced Concrete Structures by P.C. Varghese in the reference list for comprehensive study.
20. In the Advanced Structural Analysis course, the following revisions were recommended:
 - ✓ In Module-1, Unit-1, include the types of spans to provide a comprehensive understanding of structural design.

- ✓ In Unit-2, it was suggested to reconsider Kani's Method as it is considered outdated by the BoS members. The method should be reviewed for possible updates or alternatives.
- ✓ Revise the practices in Module-1 to ensure relevance and alignment with current industry standards.
- ✓ In Module-2, include the number of storeys (e.g., for continuous beams and structural analysis of multi-storey buildings). Additionally, address concepts like flexibility and structures with degrees of freedom greater than 3.
- ✓ Update the textbooks by removing Bhavikatti and including Pandit and Gupta for structural analysis. Additionally, Weaver and Grey can be considered as a reference for Matrix Methods.

21. In the Design of Steel Structures course, the following revisions were recommended:

- ✓ Include the topics of Introduction to Splicing of Columns and Built-up Beams to enhance the understanding of practical steel connections and member compositions.
- ✓ In Module-2, Unit-3, revise the title to better reflect the content, replacing "Introduction to Plate Girders and Column Base" with a more descriptive and specific heading.
- ✓ Modify the list of practices in Module-1 to align with the updated course content and current industry practices.
- ✓ Remove the textbooks by Bhavikatti and Varghese from the reference list.
- ✓ Include the textbook Design of Steel Structures by K.S. Sai Ram as a primary reference.
- ✓ Shift Subramanian text book to references.

22. In the Estimation and Costing course, the following changes were recommended:

- ✓ Remove "Metric Systems" from the syllabus, as "Units of Measurement" is already specified.
- ✓ Revise the title of Unit-2 in Module-1 to better reflect the updated content.
- ✓ Under the topic of Tenders, include important terminology such as Expression of Interest (EOI), Invitation of Tender, Bidding, and other relevant terms.
- ✓ Shift the topics on estimates related to Materials, Plant & Machinery, and Labour to Module-1, Unit-2 for better content flow.
- ✓ Include a case study on Tender Documents, with a focus on how to draft Terms & Conditions (T&C) for tenders.

- ✓ Emphasize detailed understanding and practical application of Rate Analysis across relevant units.
23. It was recommended to rename the course title from "Advanced Reinforced Concrete Design" to "Advanced Structural Design" to better reflect the broader scope of structural elements covered.
 24. In Module-2, add the topics of Gantry Girder and Plate Girder to expand the course content and enhance understanding of advanced steel structural components.
 25. In the Prestressed Concrete course, the following updates to the reference books were recommended:
 - ✓ Add Prestressed Concrete by Pandit & Gupta to the reference list.
 - ✓ Include Prestressed Concrete by T.Y. Lin for advanced understanding and design concepts.
 - ✓ Remove the textbook by Nelson from the references, as it is considered less relevant to the revised syllabus.
 26. In the Structural Dynamics course, the following revisions were recommended:
 - ✓ In Unit-2, include the topic of Multi-Degree of Freedom (MDOF) systems to provide deeper insight into complex dynamic behavior.
 - ✓ Modify the title of the topic "Introduction to Plate Vibrators" to better reflect its content and terminology—suggested revision could be "Introduction to Vibrations of Plates" or similar, depending on final syllabus framing.
 - ✓ Add the textbook Structural Dynamics by S.K. Duggal to the reference list for comprehensive coverage and clarity.
 27. Revise the entire syllabus of Construction & Project Management.
 28. In the Repair and Rehabilitation of Structures course, it was recommended to include the topic "Non-destructive Testing (NDT) of RCC Structures" to equip students with knowledge of modern assessment techniques used in evaluating structural integrity without causing damage.

The following recommendations and approvals are made after the discussion:

1. BoS Members approved the revised regulations, curriculum structure, syllabus, assessment schemes of B. Tech., Civil Engineering programme and M. Tech in Structural Engineering programme and it follows based on the NEP 2020.
2. The details of elective courses (Department/ Open/ Minor / Honour) of B. Tech., Civil Engineering Programme for the regulation R25-C25 are approved.

4. SDG mapping and incorporation of the IKS components in the syllabus is approved.

Based on the suggestions given by the members, the chairperson of BoS told that, those suggestions would be incorporated appropriately in the curriculum and syllabi of the regulation R25 C25 and this will be recommended to the Academic Council of VFSTR for the approval.

There being no further points for discussion, the Chairperson thanks all the external, internal, invited members and announced that the meeting was concluded.



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APPENDIX - I
M. Tech. PROGRAM,
REVISED COURSE STRUCTURE - C25
Pre - Semester

Course Code	Title of the course	L	T	P	SL	C	Course type
25SAB101	Orientation Session	0	2	0	0	1	Binary graded
25AMB101	IT workshop and cyber security	0	0	2	0	1	Binary graded
	Total	0	2	2	0	2	

I Year I Semester

Course Code	Title of the course	L	T	P	SL	C	Course type
25SEB101	Theory of Elasticity and Plasticity	3	2	0	3	4	Professional Core
25SEB102	Design of Reinforced Concrete for Industrial Applications	2	2	2	2	4	Professional Core
25SEB103	Design and Behaviour of Pre-Engineered Building Systems	3	2	0	3	4	Professional Core
	Department Elective - I	3	2	0	3	4	Elective
25SEB104	Teaching Assistantship	0	0	2	0	1	Binary graded
25ENB101	Indian Knowledge System	0	2	0	0	1	Binary graded
	Work-in-lieu of a course*					2	Elective & Floating Credit
	Sub Total	11	10	4	11	20	
	Add on course -I					3	
	Total	11	10	4	11	23	

I Year II Semester

Course Code	Title of the course	L	T	P	SL	C	Course type
25SEB105	Structural Dynamics	2	2	2	3	4	Professional Core
25SEB106	Finite Element Analysis of Structures	3	2	0	2	4	Professional Core
	Department Elective - 2	3	2	0	3	4	Elective
	Department Elective - 3	3	2	0	3	4	Elective
25MSB101	Research Methodology & IPR	1	2	0	1	2	Interdisciplinary
25SEB107	Interdepartmental Project	0	0	2	0	1	Project
25SEB108	Teaching Assistantship	0	0	2	0	1	Binary graded
	Sub Total	12	10	6	12	20	
	Add on course -2					3	
	Total	12	10	6	12	23	

II Year I Semester

Course Code	Title of the course	L	T	P	SL	C	Course type
25SEB201/ 25SEB202	Project/Internship	0	2	24	0	13	Project
	Sub Total	0	2	24	0	13	
	Add on course -3 (MOOCs Course)					3	
	Total	0	2	24	0	16	

II Year II Semester

Course Code	Title of the course	L	T	P	SL	C	Course type
25SEB203/ 25SEB204	Project/Internship	0	2	24	0	13	Project
	Sub Total	0	2	24	0	13	
	Add on course -4 (MOOCs Course)					3	
	Total	0	2	24	0	16	

Department Electives

Course Code	Title of the course	L	T	P	SL	C
25SEB801	Structural Optimisation	3	2	0	3	4
25SEB802	Earthquake Resistant Design of Structures	3	2	0	3	4
25SEB803	Advanced Concrete Technology	2	2	2	2	4
25SEB804	Bridge Engineering	3	2	0	3	4
25SEB805	Advance Foundation Engineering	3	2	0	3	4
25SEB806	Advanced Steel Structural Design	3	2	0	3	4
25SEB807	Repair and Rehabilitation of Structures	3	2	0	3	4

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Chairperson

School of Core Engineering
 Department of Civil Engineering

APPENDIX - II

List of Courses that Enables Employability or Entrepreneurship or Skill Development

S. No.	Course Code	Course Title	Year of Introduction	Employability / Entrepreneurship / Skill development
1	25SEB101	Theory of Elasticity and Plasticity	2025	Skill development: This course builds strong analytical and mathematical foundations in elasticity, tensor analysis, and energy methods essential for advanced structural analysis, computational mechanics, and higher studies. It enhances problem-solving skills required for core engineering roles, research, and design-based industries.
2	25SEB102	Design of Reinforced Concrete for Industrial Applications	2025	Employability & Skill Development: The course strengthens industry-ready competencies through code-based industrial RCC design, seismic analysis, machine foundation design, and hands-on use of professional software such as STAAD.Pro, ETABS, and AutoCAD, thereby enhancing graduates' immediate employability in infrastructure, EPC, and industrial construction sectors while building advanced structural engineering skills.
3	25SEB103	Design and Behaviour of Pre-Engineered Building Systems	2025	Skill development, Employability & Entrepreneurship: It provides industry-oriented hands-on training in Pre-Engineered Building (PEB) design, crane systems, software-based modelling, optimization, detailing, and construction practices directly aligned with current industrial requirements.
4	25SEB105	Structural Dynamics	2025	Employability: The course prepares students for professional roles in structural design and analysis by imparting practical optimization techniques and computational skills used in industry and research.

5	25SEB106	Finite Element Analysis of Structures	2025	<p>Employability: This syllabus equips students with industry-relevant structural analysis and finite element modelling skills aligned with professional design codes, directly preparing them for roles in structural design and analysis.</p> <p>Employability: The course equips students with analytical and computational optimisation techniques widely used in structural design, analysis, and software-driven engineering practice. These skills directly enhance job readiness in design consultancies, infrastructure firms, and R&D roles rather than focusing on venture creation.</p>
6	25SEB801	Structural Optimisation	2025	<p>Skill development: The course develops professional competencies in seismic analysis, code-based design, and ductile detailing as per IS 1893 and IS 13920, which are essential for structural design and consultancy roles. It directly enhances industry readiness for careers in earthquake engineering, infrastructure design, and safety-critical construction projects.</p> <p>Skill development & Employability: This syllabus develops industry-ready expertise in advanced, special, and sustainable concrete technologies—directly aligning with professional roles in construction, materials testing, quality control, and infrastructure development.</p> <p>Employability: The Bridge Engineering course primarily strengthens employability by equipping students with practical competencies in bridge analysis, design, and interpretation of IRC codes.</p>
7	25SEB802	Earthquake Resistant Design of Structures	2025	<p>Employability & Skill Development: The syllabus equips students with cutting-edge, practice-oriented geotechnical skills—advanced soil behavior, modern in-situ testing, digital ground modelling, smart foundation design, and performance monitoring—directly aligned with industry requirements for geotechnical engineers, foundation specialists, and infrastructure consultants.</p>
8	25SEB803	Advanced Concrete Technology	2025	
9	25SEB804	Bridge Engineering	2025	
10	25SEB805	Advance Foundation Engineering	2025	

11	255E3006	Advanced Steel Structural Design	2025	Employability & Skill Development: The course develops industry-ready competencies through advanced steel member design, tower and chimney analysis, composite construction, fatigue assessment, and extensive use of professional software such as STAAD Pro, ETABS, and Tekla, thereby directly enhancing graduate employability in structural consulting firms, EPC companies, fabrication industries, and infrastructure projects while simultaneously strengthening advanced structural engineering skills.
12	255E3007	Repair and Rehabilitation of Structures	2025	Employability: The course develops industry-oriented competencies in condition assessment, non-destructive testing, material selection, and repair strategies, which are essential for professional practice in structural consultancy and infrastructure maintenance. These skills directly enhance job readiness in construction, quality assurance, and structural rehabilitation projects.

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APPENDIX - III

Comparison of Course Contents between R25-C75 and R22-C22/C24 Curriculums

S. No.	Course Code	Course Title	% of Changes	Justification for Changes
1	25SEB101	Theory of Elasticity and Plasticity	20%	Introduced by incorporating advanced tensor concepts, energy theorems, and variational principles. These changes strengthen analytical depth, modern elasticity formulation, and alignment with higher studies and industry-oriented computational analysis.
2	25SEB102	Design of Reinforced Concrete for Industrial Applications	100%	The course Design of Reinforced Concrete for Industrial Applications has been completely revised to align with rapid advancements in industrial construction practices, updated design codes, automation-driven construction methods, and emerging requirements such as durability-based design, sustainability, prefabrication, and performance-oriented industrial structures, ensuring graduates are fully equipped for contemporary industry needs and enhanced employability.

3	25SEB103	Design and Behavior of Pre-Engineered Building Systems	100%	To address the growing industry demand for specialized expertise in Pre-Engineered Buildings (PEB), which are widely adopted in industrial, commercial, and infrastructure projects. The course equips postgraduate students with advanced knowledge of cold-formed steel behavior, crane systems, mezzanine structures, software-based analysis, optimization techniques, and practical detailing, thereby bridging the gap between conventional structural design education and modern industrial construction practices.
4	25SEB105	Structural Dynamics	20%	To strengthen vibration analysis concepts by incorporating practical computation of dynamic responses, response spectrum interpretation, and multi-degree-of-freedom system analysis, thereby aligning the course with modern structural dynamics practice and industry expectations.
5	25SEB106	Finite Element Analysis of Structures	30%	To incorporate advanced finite element formulation, hands-on analytical practices, and current code-based applications, ensuring alignment with modern industry requirements and improving graduate employability in structural analysis and design roles.
6	25SEB001	Structural Optimisation	25%	The syllabus has been modified to incorporate advanced optimization techniques, multivariable and constrained problem formulations, and practical structural engineering applications. These enhancements align the course with current industry practices and computational tools, thereby improving students' analytical capability, design efficiency, and employability in structural engineering and allied domains.

7	25SEB802	Earthquake Resistant Design of Structures	25%	The syllabus has been modified by approximately 25% to incorporate advanced seismic analysis methods, ductility-based design philosophy, and base isolation concepts in line with current IS codes and professional practice. These updates strengthen practical design skills, code compliance, and industry relevance, thereby enhancing graduates' employability in earthquake-resistant structural design and consultancy.
8	25SEB803	Advanced Concrete Technology	25%	To incorporate emerging and industry-relevant concrete technologies, including sustainable and low-carbon concretes, geopolymers concrete, recycled aggregate concrete, self-healing concrete, 3D printed concrete, advanced admixtures, and enhanced durability and non-destructive testing methods, ensuring alignment with current construction practices, sustainability goals, and employability requirements.
9	25SEB804	Bridge Engineering	35%	<p>Module-1: Covers fundamentals of bridge engineering including classification of bridges, site investigation, economic span selection, loading standards (IRC and railway loads), impact factors, and analysis and design of bridge substructures and slab bridge superstructures.</p> <p>Module-2: Focuses on advanced bridge design covering T-beam bridge superstructures using standard load distribution methods, design of longitudinal girders, bearings and expansion joints, and practical exposure to IRC code provisions and modern bridge design practices.*</p>

10	25SEB805	Advance Foundation Engineering	25%	To integrate advanced and emerging geotechnical engineering practices, including Critical State Soil Mechanics for foundations, probabilistic and reliability-based soil parameter assessment, smart and AI-enabled site investigation techniques, 3D digital ground modelling, advanced shallow and deep foundation design under cyclic and seismic loading, sustainable ground improvement methods, bio-mediated soil stabilization (MICP), and smart foundation monitoring using IoT and digital twins, ensuring strong alignment with current industry practices, sustainability needs, and enhanced employability.
11	25SEB806	Advanced Steel Structural Design	100%	New Course
12	25SEB807	Repair and Rehabilitation of Structures	20%	The syllabus has been modified to incorporate advanced non-destructive testing techniques, contemporary repair materials, and sustainable rehabilitation strategies aligned with current codes and industry practices. These updates strengthen practical exposure, diagnostic skills, and professional competence required for modern structural maintenance and rehabilitation works.

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APPENDIX - IV

List of New Courses in the R25-C25 Curriculum

S. No.	Course Code	Course Title	% of Changes	Justification for Changes
1	25SEB101	Theory of Elasticity and Plasticity	20%	Introduced by incorporating advanced tensor concepts, energy theorems, and variational principles. These changes strengthen analytical depth, modern elasticity formulation, and alignment with higher studies and industry-oriented computational analysis.
2	25SEB102	Design of Reinforced Concrete for Industrial Applications	100%	The course Design of Reinforced Concrete for Industrial Applications has been completely revised to align with rapid advancements in industrial construction practices, updated design codes, automation-driven construction methods, and emerging requirements such as durability-based design, sustainability, prefabrication, and performance-oriented industrial structures, ensuring graduates are fully equipped for contemporary industry needs and enhanced employability.

3	25SEB103	Design and Behaviour of Pre-Engineered Building Systems	100%	To address the growing industry demand for specialised expertise in Pre-Engineered Buildings (PEB), which are widely adopted in industrial, commercial, and infrastructure projects. The course equips postgraduate students with advanced knowledge of cold-formed steel behavior, crane systems, mezzanine structures, software-based analysis, optimization techniques, and practical detailing, thereby bridging the gap between conventional structural design education and modern industrial construction practices.
4	25SEB105	Structural Dynamics	20%	To strengthen vibration analysis concepts by incorporating practical computation of dynamic responses, response spectrum interpretation, and multi-degree-of-freedom system analysis, thereby aligning the course with modern structural dynamics practice and industry expectations.
5	25SEB106	Finite Element Analysis of Structures	20%	To incorporate advanced finite element formulation, hands-on analytical practices, and current code-based applications, ensuring alignment with modern industry requirements and improving graduate employability in structural analysis and design roles.
6	25SEB101	Structural Optimization	25%	To incorporate advanced optimization techniques, multi-variable and constrained problem formulations, and practical structural engineering applications. These enhancements align the course with current industry practices and computational tools, thereby improving students' analytical capability, design efficiency, and employability in structural engineering and allied domains.

7	25SEB802	Earthquake Resistant Design of Structures	25%	To incorporate advanced seismic analysis methods, ductility-based design philosophy, and base isolation concepts in line with current IS codes and professional practice. These updates strengthen practical design skills, code compliance, and industry relevance, thereby enhancing graduates' employability in earthquake-resistant structural design and consultancy.
8	25SEB803	Advanced Concrete Technology	25%	To incorporate emerging and industry-relevant concrete technologies, including sustainable and low-carbon concretes, geopolymer concrete, recycled aggregate concrete, self-healing concrete, 3D printed concrete, advanced admixtures, and enhanced durability and non-destructive testing methods, ensuring alignment with current construction practices, sustainability goals, and employability requirements.
10	25SEB805	Advance Foundation Engineering	25%	To integrate advanced and emerging geotechnical engineering practices, including Critical State Soil Mechanics for foundations, probabilistic and reliability-based soil parameter assessment, smart and AI-enabled site investigation techniques, 3D digital ground modeling, advanced shallow and deep foundation design under cyclic and seismic loading, sustainable ground improvement methods, bio-mediated soil stabilization (MICP), and smart foundation monitoring using IoT and digital twins, ensuring strong alignment with current industry practices, sustainability needs, and enhanced employability.
11	25SEB806	Advanced Steel Structural Design	100%	New Course

12	25SEEB007	Repair and Rehabilitation of Structures	30%	The syllabus has been modified to incorporate advanced non-destructive testing techniques, contemporary repair materials, and sustainable rehabilitation strategies aligned with current codes and industry practices. These updates strengthen practical exposure, diagnostic skills, and professional competence required for modern structural maintenance and rehabilitation works.
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Department of Civil Engineering**

APPENDIX - V

List of Courses in the B.TECH Curriculum Incorporating IKS

S. No	Course Code	Course Title	Type of Course	Module (Unit)	IKS Components Incorporated
1	25SEB101	Theory of Elasticity and Plasticity	Mandatory	M1 (U1&U2) M2 (U1, U2 & U3)	Concepts such as stress-strain behavior, equilibrium, compatibility, energy principles, and superposition along with traditional Indian wisdom/philosophy of balance (Bhaya), structural stability, material response, and energy-based reasoning seen in ancient Indian architectural and mechanical practices (e.g., <i>Chitra Shikha</i> and <i>Sula Sutra</i>).
2	25SEB102	Design of Reinforced Concrete for Industrial Applications	Mandatory	M1 (U1&U2) M2 (U1, U2 & U3)	Module 1 integrates Indian engineering knowledge through the use of national code provisions (IS 456, IS 875, IS 1803, IS 3370, IS 2974) developed from indigenous research, Indian climate-specific conditions, material behavior studies, and long-term performance of industrial structures across the country. Module 2 embeds IKS through Indian scientific/rational detailing philosophy (IS 18920), machine foundation design practices (IS 2974), storage structure codes (IS 499), IS 3370, and durability-based design approaches evolved from Indian industrial experience and research institutions.
3	25SEB103	Design and Behaviour of Pre-Engineered Building Systems	Mandatory	M1 (U1&U2) M2 (U1, U2 & U3)	Ancient Indian structural wisdom in temple halls, monasteries, and iron pillar design. Ancient lifting and material handling devices (systems, pulley systems). Wisdom/cultural philosophy in traditional Indian construction.
4	25SEB105	Structural Dynamics	Mandatory	M1 (U1&U2) M2 (U1, U2 & U3)	N/A

5	25SEB06	Finite Element Analysis of Structures	Mandatory	M1 (U1&U2) M2 (U1, U2 & U3)	NA
6	25SEB01	Structural Optimisation	Department Elective	M1 (U1&U2) M2 (U1, U2 & U3)	Incorporation of traditional Indian structural design philosophies—such as optimal material usage, geometric proportioning, and load-path efficiency observed in ancient temples, stupas, and stone bridges—as illustrative examples while teaching optimisation concepts like objective functions and constraints.
7	25SEB02	Earthquake Resistant Design of Structures	Department Elective	M1 (U1&U2) M2 (U1, U2 & U3)	Study of earthquake-resistant features in traditional Indian constructions such as timber-laced masonry (Kath-Khata, Dhaj-Dwara), stone temples, and stupa structures, highlighting inherent ductility, energy dissipation, and redundancy concepts.
8	25SEB03	Advanced Concrete Technology	Department Elective	M1 (U1&U2) M2 (U1, U2 & U3)	Traditional lime-based binders and indigenous material knowledge – <i>Comparative concrete and supplementary cementitious materials</i> .
9	25SEB04	Bridge Engineering	Department Elective	M1 (U1 & U2)	This module integrates Indian Knowledge Systems by introducing traditional Indian bridge planning and construction practices. Ancient stone and wooden bridges reflect indigenous understanding of site investigation, span selection, and load transfer using local materials.
				M2 (U3, U2 & U1)	This module incorporates IKS through ancient Indian concepts of load paths, structural balance, and movement accommodation. Traditional cantilevered and beam-based bridges illustrate early principles of load distribution and bearing behavior. Indigenous practices emphasize durability, use of local materials, and sustainability in bridge engineering.
10	25SEB05	Advance Foundation Engineering	Department Elective	M1 (U1&U2) M2 (U1, U2 & U3)	The syllabus aligns with indigenous Indian knowledge systems that emphasized empirical and assessment, ground suitability, and early foundation practices in traditional architecture, now enriched through modern testing, digital modeling, and monitoring techniques.

11	25SEB806	Advanced Steel Structural Design	Mandatory	M1 (U1&U2) M2 (U1, U2 & U3)	Module 1 integrates Indian engineering know ledge through the application of national steel design codes (IS 800, IS 875, IS 1903, IS 802, IS 6533) developed from indigenous research on Indian climatic conditions, seismicity, fatigue performance, corrosion environments, and long-term behaviour of towers, chimneys, and industrial steel structures Module 2 embeds IES through Indian bridge and composite construction standards (IS provisions, IS 1584, IS 801, IS 8111, fabrication and connection-detailing practices evolved in Indian steel industries, and research-driven novel approaches for cold-formed sections, fatigue-resistant girders, and durable composite systems under Indian service conditions.
12	25SEB807	Repair and Rehabilitation of Structures	Department Elective	M1 (U1&U2) M2 (U1, U2 & U3)	Study of durability and longevity principles observed in traditional Indian structures such as masonry temples, stupas, forts, and time-sinks masonry, focusing on natural materials, construction detailing, and maintenance practices that enhanced resistance to weathering and environmental degradation

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APPENDIX - VI

List of Courses in the R25-C25 Curriculum Incorporating IKS

S. No	Course Code	Course Title	Type of Course	SDGs Covered	Justification
1	25SEB101	Theory of Elasticity and Plasticity	Mandatory	9	Fundamentals of stress, strain, equilibrium and constitutive relations ensure safe and reliable design of infrastructure systems.
				11	Analysis of stress distribution, cantilever, curved bars, and plates supports safe components used in buildings and other infrastructure.
				12	Energy methods and optimization theories promote optimized structural design, minimizing material usage and resource wastage.
				4	Tensor formulation enhances advanced mathematical understanding and analytical rigor essential for higher engineering, education and research.
				9	Promotes resilient industrial facilities through advanced RCC design, seismic detailing, foundations, and software-based structural analysis.
				11	Ensures safe and disaster-resistant industrial buildings using circular seismic, fire-resistance, durability-based design approaches.

Revision of Reinforced Concrete for

2	25SEB102	Design of Reinforced Concrete for Industrial Applications	Mandatory	12	Encourages material-efficient RCC design, optimized structural systems, and innovative concepts that reduce resource use and lifecycle costs.
				13	Addresses climate-responsive infrastructure through thermal stress design, column load consideration, and earthquake-resilient RCC systems.
3	25SEB103	Design and Behaviour of Pre-Engineered Building Systems	Mandatory	9	Promotes modern, industrialized construction systems.
				11	Structural systems for sustainable industrial and urban buildings.
				12	Efficient use of materials and reduction of construction waste.
4	25SEB105	Structural Dynamics	Mandatory	9	In structural dynamics and vibration analysis essential for the design of safe, resilient, and reliable infrastructure and machinery foundations, supporting sustainable industrial and infrastructure development.
5	25SEB106	Finite Element Analysis of Structures	Mandatory	9	Capabilities in advanced structural analysis and finite element methods, supporting the design of safe, efficient, and innovative infrastructure systems essential for sustainable industrial and infrastructural development.
6	25SEB801	Structural Optimisation	Department Elective	9	Structural optimisation directly supports resilient, efficient, and innovative infrastructure development through advanced design and computational techniques.
7	25SEB802	Earthquake Resistant Design of Structures	Department Elective	11	The course focuses on earthquake-resistant and safe building design, directly contributing to disaster-resilient, sustainable, and safe urban infrastructure.

8	25SEB803	Advance of Concrete Technology	Department Elective	9	Advanced and special concrete enhance the performance, durability, and innovation of infrastructure systems.
				12	Promotes efficient resource utilization and reduction of construction waste through sustainable material practices.
				13	Reduces carbon emissions associated with cement production, supporting climate-resilient construction.
9	25SEB804	Bridge Engineering	Department Elective	9	The course focuses on planning, analysis, and design of bridges using IRC codes, modern load distribution methods, and advanced bearings, supporting safe, resilient, and innovative infrastructure development.
				11	Bridge design emphasizes durability, serviceability, and efficient connectivity, contributing to sustainable transport networks and improved accessibility in urban and rural communities.
				13	Concepts of load effects, durability, expansion joints, and bearings address environmental impacts, temperature variations, and resilience of bridges under changing climatic conditions.
10	25SEB805	Advance Foundation Engineering	Department Elective	9	Promotes innovation, resilience, and reliability in infrastructure through advanced geotechnical design and monitoring technologies.
				11	Supports safe, resilient, and sustainable urban development by improving foundation performance and ground stability.

				12	Encourages resource efficiency and sustainable material use in foundation engineering.
11	25SEB806	Advanced Steel Structural Design	Mandatory	9	Supports resilient and efficient infrastructure through advanced steel design of towers, chimneys, plate girders, composite systems, and long-span industrial structures.
				11	Promotes disaster-resilient urban and industrial buildings using wind- and seismic-resistant steel systems and code/safety-based detailing.
				12	Encourages optimized steel usage, fatigue-resistant detailing, and composite construction for reduced material consumption and improved lifecycle performance.
				13	Addresses climate-responsive infrastructure through wind engineering, thermal stress evaluation, corrosion protection, and seismic-resistant structural systems.
12	25SEB807	Repair and Rehabilitation of Structures	Department Elective	12	The course emphasizes extending service life and optimizing use of materials through repair strategies, thereby reducing resource consumption and construction waste.

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APPENDIX VII

Action Taken Report (ATR) on the suggestions given in earlier BoS meetings

S. No.	Action Point	Response
1	Need to strengthen advanced theoretical foundation in structural engineering	Core courses such as Theory of Elasticity and Plasticity, Structural Dynamics, and Finite Element Analysis of Structures have been included to provide strong analytical and mathematical foundations required for advanced structural research and design.
2	Limited exposure to industry-oriented structural design practices	Design of Reinforced Concrete for Industrial Applications and Design and Behaviour of Pre-Engineered Building Systems have been introduced to address real-world industrial structures, large-span systems, and modern construction practices.
3	Emphasis on outcome-based education and employability	The revised course structure balances theory, tutorials, practicals, seminars, and projects, ensuring improved employability, analytical competence, and readiness for professional practice.
4	Insufficient computational and numerical analysis skills	Finite Element Analysis of Structures has been included as a core course to enhance numerical modelling, simulation, and computational analysis skills essential for industry and research.

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