RESEARCH PLAN

STRUCTURAL ENGINEERING DEPARTMENT

VISION	To conduct outstanding research in the field of Structural Engineering and Construction with profound recognition locally, regionally, and internationally, which tackles engineering problems in an innovative and sustainable approaches; with effective mutual coordination with international research authorities; and provide competitive graduates capable of dealing with research challenges and practicing engineering profession efficiently.

MISSION	• Developing methods used in the analysis, design and evaluation of civil structures. • Developing specifications and codes of practice in the field of structural engineering. • Providing laboratory facilities, testing techniques and data bases for the properties and strength of traditional, advanced, smart and green construction materials. • Producing studies and practical solutions for problems in the field of structural engineering to serve the community and develop the environment. • Studying and developing construction projects management methods, and providing practical solutions for updating the formal construction sector and overcome the difficulties facing it. • Providing outstanding educational services through the participation of civil engineering students (undergraduate and graduate) in the on-going research activities of the department.

	The Department believes that in order to ensure commitment to the topics of research specified in the devised plan, and to ensure fulfilling the Department vision and mission in the most perfect way possible, the following execution mechanisms should be strictly adhered to: • Holding periodical meetings for all faculty members of each of the

EXECUTION MECHANISMS OF RESEARCH PLAN	Department five divisions to review the topics of on-going research in the Division, whether related to M.Sc. or Ph.D. theses, or concerning the faculty personal research. This is to ensure that these topics of research are coherent with the Department vision and mission of the devised plan, and to avoid duplication of research points dealt with by more than one faculty member. • Holding an expanded meeting for faculty members of all five divisions together, at least once per academic year, dedicated to review the on-going research in the different divisions and the extent to which the research topics match the mission and goals of the desired Department research plan. • Organizing general meetings by the Structural Engineering Department, at least once a year, with representatives of construction industry and building materials companies, with concerned consulting offices, to get acquainted with the problems facing them and the research work needed to handle and solve these problems. • Intensifying the efforts of the Department to seek the sustained help of different companies in the fields of construction industry and building materials to provide the financial support and funds necessary for conducting research work solving the problems and difficulties facing these companies.

DEPARTMENT MAIN DIVISIONS	1	Structural Analysis and Mechanics
	2	Properties and Strength of Materials
	3	Reinforced Concrete
	4	Metallic Structures and Bridges
	5	Construction Engineering and Management

	The Department of Structural Engineering is a major supporter of the ongoing development projects in the Arab Republic of Egypt and the regional MENA area, where there is a distinguished community of scientists and researchers who participate in the activities of scientific research and engineering consultancy. The department

The Research Plan Supports Tracks & Axes of National Strategy for Science, Technology & Innovation 2030	research plan was developed to reflect a clear future vision of the faculty and university, which in turn serves the implementation of the National Strategy for Science, Technology and Innovation 2030. The research plan supports the first track of the national strategy through distinguished research in the field of structural and construction engineering with a prominent position locally, regionally and globally, addressing engineering problems in innovative and sustainable ways. It also aims at effective mutual participation with international research bodies, preparing a graduate capable of dealing with research challenges and practicing the structural engineering profession according to the local, regional and global market needs. The research plan supports, as well, the second track of the national strategy as follows: ● The first axis (Energy) through distinguished research in the field of modern and innovative construction materials that serve the different structural systems for new and renewable energy facilities. ● The fifth axis (Environment and Natural Resources Protection), the sixth axis (Technological Applications and Future and Interdisciplinary Sciences), and the eighth axis (Communication and Information Technology) through distinguished research to promote the use of Building Information Modeling (BIM) in the construction industry to achieve green and sustainable construction, as well as to enrich the industry database, electronic communications and E-governance. ● The eleventh axis (Investment, Trade and Transportation) through distinguished research in the field of advanced structural systems to facilitate transportation means, and modern construction techniques for various types of

	roadways, railways, and pedestrian bridges. ● The twelfth axis (Tourism Industry) through distinguished research in the field of advanced methods for strengthening and restoration of archaeological buildings and associated facilities.
RESEARCH TOPICS	● Linear and Non-Linear Analysis of the Behavior of Structures and Structural Members ● Stability of Structures and Slender Structural Members ● Solid and Computational Mechanics ● Soil-Structure Interaction and Foundation Systems ●Dynamic Analysis and Vibrations for Structural and Civil Systems ● Modeling and Simulation of Structural and Civil Systems ● Earthquake Engineering and Seismic Design ●Analysis by Lateral Pushover and Evaluation of Seismic Performance ● Techniques of Rehabilitation and Repair of Structures ● Study of Fatigue in Metallic Members and Connections ● Study, Evaluation and Enhancement of Specifications and Codes of Practice in the Field of Structural Engineering ● Control of Dynamic Behavior of Structures ● Computer-Aided Design ● Structural Analysis of Tanks and Silos ● Utilization of Steel in Low Cost Buildings ● Structural Analysis and Design of Straight and Skewed Bridges ● Structural Analysis of Special Members such as Curved Beams, Plates and Shells ● Plastic Analysis of Structural Members ● Study of Structural Optimization for Buildings, Bridges, Towers, and Structural Members ● Analysis and Design of Cable-Guyed Buildings, Roofs, Girders, and Towers ● Analysis and Design of Buildings with Cold-Formed Steel Sections ● Study of Structural Composite Sections and Connections ● Supporting Structures and Tanks Using Fiber-Reinforced Polymers

	• Applications of Neural Networks in Structural Design •Modern Developments and Innovative Applications of Construction Materials in Green Structures • Adapted Technology of Alternative Construction Materials for Low Cost Housing • Applications of Composite, Smart & Green Construction Materials • Investigating Properties of Newly Introduced Types of Cement • Investigating possible Utilization of Chimney Dust of Cement Factories • Recycling of Construction Materials • Modern, Traditional and Non-Traditional Materials for Repair •Durability of Construction Materials in Different Exposure Conditions • Investigating Properties and local Production Methods for Special Types of Concrete • Investigating Properties of High Strength and Fiber Reinforced Concretes • Applications of Fracture Mechanics Theory on Concrete • Behavior of Structures Subjected to Explosions • Behavior of Structures Subjected to Impact Loading • Investigating Progressive Collapse of Structures • Analysis and Behavior of Steel Connections • Fatigue of Steel and Metallic Members • Analysis of Steel Frames Under Seismic Loading • Stability of Steel Beams Under Various Loading Conditions • Analysis and Dynamic Control of Steel Structures • Optimization Analysis for Steel Structures • Stability and Dynamic Analysis of Metallic Plates • Seismic Analysis of Steel Bridges • Planning and Management of Construction Projects • Investment Analysis and Cost Evaluation of Construction Projects •Measuring Productivity and Performance Enhancement in Construction Sites and Construction Sector Companies • Cost Engineering and Quantitative Analysis Though Structure Life

	● Value Engineering ● Contracts and Claims Management and Dispute Settlements ● Infrastructure Assessment and Management Systems ● Professional Health and Safety Management ● Construction Methods and equipment ● Simulation and Modeling Techniques of Construction Operations ●Risk Management and Quantitative Modeling in Construction Projects ● Decision Support Systems ● Applications of Artificial Intelligence in Construction Engineering and Management ●Information and Knowledge Management in Construction Operations ● Building Information Modeling (BIM) ● Sustainable and Green Infrastructure and Structural Systems