Research plan for Harbor Engineering specialty

- 1. Study the effect of marine structures on the stability of the shoreline numerically and experimentally
- 2. Study the impact of climatic changes on sea level rise and its impact on beaches
- 3. Studying the conversion of wave energy into electrical energy for use in sustainable development
- 4. Protecting ports, beaches and bathing basins by using breakwaters that have a limited impact on neighboring beaches
- 5. Study the efficiency and development of the performance of Egyptian ports
- 6. Study the impact of drains and wastewater on the water quality in coastal areas.
- 7. Integrated management of coastal protection systems on Egyptian beaches
- 8. Integrated management of Egyptian ports and its impact on national income
- 9. Study the changes that occur in lakes and how to maximize the benefit from lakes in Egypt
- 10. Protection and development of the northern lakes' mouths.

Research plan for Hydraulics specialty

- 1. Investigation of the environmental, social, and economic impacts of the canal lining.
- 2. Investigating the potential sustainability of the sandstone Nubian aquifer from hydraulics point of view.
- 3. Assessment of hydraulic structures along the Egyptian irrigation network and their rehabilitations.
- 4. Studying all options for sustainable management of water resources of Egypt from hydraulics point of view.
- 5. Investigating the potential harvesting of rainwater in allover wet areas of Egypt (Sinia, south Egypt, Costal zone) from hydraulics point of view.
- 6. Applications of geographic information systems and remote sensing in the fields of hydraulics and water resources from hydraulics point of view
- 7. Applications of artificial intelligence in the fields of hydraulics and water resources from hydraulics point of view.
- 8. Experimental and Numerical studies for scour and erosion phenomena happening in canal bed that may endanger the structures later.
- 9. Hydraulic study of Energy dissipation structures and how to increase their efficiency, where the authority has recently intensified its efforts for these facilities to reduce the risks resulting from high kinetic energy.
- 10. Usage of water as renewable energy to generate electricity through turbines to meet the market's needs for electricity because importing the electricity costs a lot.
- 11. Investigation of structures used for Flood resistance as it is considered one of the most common risks that expose roads to collapse, therefore, culverts are addressed as a solution to this problem.
- **12.** Study of stilling basins downstream of pump stations. Recently the pump station is considered one of most important hydraulic structures.

Research Plan for Water Resources and Hydrology Group

- 1. Assessment the environmental and/or climate change impact on one of the following subjects:
 - A. Water resources management in Egypt suggesting appropriate mitigation measures.
 - B. Different hydrological parameters in the upper River Nile countries.
 - C. Mega water resources projects in Egypt.
- 2. Using GIS and Remote Sensing in:
 - A. Watershed management.
 - B. Water resources management and planning.
- 3. Rainwater harvesting in the upper River Nile countries.
- 4. Flash flood prediction and mitigation.
- 5. Sediment transport in flood zone.
- 6. Assessment of using nonconventional water resources in water resources planning in Egypt.
- 7. Water sources protection from different pollutants sources and risk.
- 8. Decreasing water losses and preserving the available water resources.
- 9. Assessment of groundwater sustainability in Egypt.
- 10. Water quality management of canal and drain network in Egypt.
- 11. Integrated water resources management in River Basins.
- 12. Evaluation of different water resources systems (Irrigation, Drainage, Distribution Network, etc.) in Egypt.
- 13. Achieving high-quality livelihoods through sustainable irrigation water development and management in Egypt.
- 14. Achieving food security by managing water for agriculture in a more sustainable and productive manner.

Research plan for Water Structures specialty

- 1. Numerical and experimental stability investigations (embankment and concrete gravity dams).
- 2. Concentrated leak erosion (embankment dams).
- 3. Internal erosion sensitivity / internal migration (embankment dams).
- 4. Seismic dam analysis (embankment and concrete gravity dams).
- 5. Seepage through dams and control methods (embankment dams).
- 6. Breach analysis of dams and flood propagation modeling (embankment and concrete gravity dams).
- 7. Flood protection and control.
- 8. Culverts, syphons stability investigations.
- 9. Bridges analysis, moreover its foundation erosion investigations and control.
- 10. Pump station studies.
- 11. Regulators stability analysis, furthermore seepage investigations and energy dissipation.

- 12. Tunnels stability investigations.
- 13. Seepage around tunnels modeling.
- 14. Multi-tunnels interaction and effects.
- 15. Locks stability investigation.
- 16. Risks of structural failure of navigation locks.