

THE ANCIENT AND MODERN MARVELS AND WONDERS OF CIVIL ENGINEERING

PRESENTED BY:-

**SURYANSH
THAKUR**

2314079

CONTENTS

- **Ancient Vs Modern Civil Engineering**
- **Ancient Wonders Of Civil Engineering**
- **Modern Marvels Of Civil Engineering**
- **New Ways And Methods In Modern Civil Engineering**
- **Lessons From Modern Civil Engineering**

ANCIENT VS MODERN CIVIL ENGINEERING

- **Materials:** Relied On Natural Materials Like Stone, Wood, Brick & Mud.
- **Tools:** Basic Tools Made Of Stone, Bronze Or Iron Often Requiring Huge Labor.
- **Knowledge:** Empirical Knowledge Based On Trial And Error
- **Structures:** Focused On Fortifications, Monumental Buildings And Basic Infra Like Roads & Canals Were In Smaller Scale.
- **Materials:** Vast Array Of Materials Like Concrete, Steel, Aluminium & Composites.
- **Tools:** Advanced Machinery, Computers And Specialised Equipment For Efficiency.
- **Knowledge:** Extensive Theoretical & Practical Knowledge Based On Scientific And Engineering Principles.
- **Structures:** Diverse Structures Like Skyscrapers, Bridges, Tunnels, Dams ,Airports & Complex Transportation Systems.

ANCIENT WONDERS OF CIVIL ENGINEERING

Great Pyramid Of Giza:

- i. Constructed From Millions Of Precisely Cut & Fitted Limestone Blocks. This Shows High Level Of Stone Quarrying, Transportation & Masonry Skills.
- ii. Alignment Of Structures With Celestial Bodies & Base Is Aligned With Cardinal Points Of Compass.
- iii. Pyramids Withstand Firm Due To Good Understanding Of Weight Distribution, Load Bearing & Structural Stability.
- iv. Organizing & Managing Huge Workforce Implies Efficient Project Management & Logistical Planning.
- v. Use Of Ramps To Transport Massive Stones To Upper Levels Of Pyramid, Which Shows Knowledge Of Inclined Planes & Application In Construction .



The Great Wall Of China

- i. **Diverse Materials:** Different Materials Like Stone In The Mountains, While In Plains Rammed Earth Was Used & Brick Used For Increased Durability .
- ii. **Human Labor:** Constructed By Human Labor Which Showcase Immense Workforce & Organizational Skills Of The Time.
- iii. **Adaptive Design & Terrain Variations:** Adapted To Terrain, With Variations In Height, Width & Structure To Suit Different Geographical Conditions.
- iv. **Integrating Drainage Systems:** To Prevent Erosion & Watchtowers Providing Surveillance Demonstrating Military Engineering Understanding.



COLOSSEUM

- **Concrete:** Romans Were Pioneers In Concrete Technology Which Allowed The Creation Of Large Complex Structures With Greater Flexibility Than Traditional Stone Masonry.
- **Arches & Vaults:** Structure Heavily Relies On Arches & Vaults Which Efficiently Distribute Weight, Allowing For Larger Spans & Higher Elevations.
- **Foundation:** Built On A Marshy Area, But They Overcame By Creating A Solid Base Using Concrete & Drainage Systems To Stabilize The Ground.
- **Ventilation:** Features To Facilitate Air Circulation, Ensuring Comfortable Environment For Vast Audience.
- **Load Bearing Capacity:** Designed To Support Weight Of Huge Audience Along With Stresses Of Arches & Vaults, Thick Walls.
- **Drainage System:** Efficient Drainage System Was Incorporated To Prevent Water Logging.

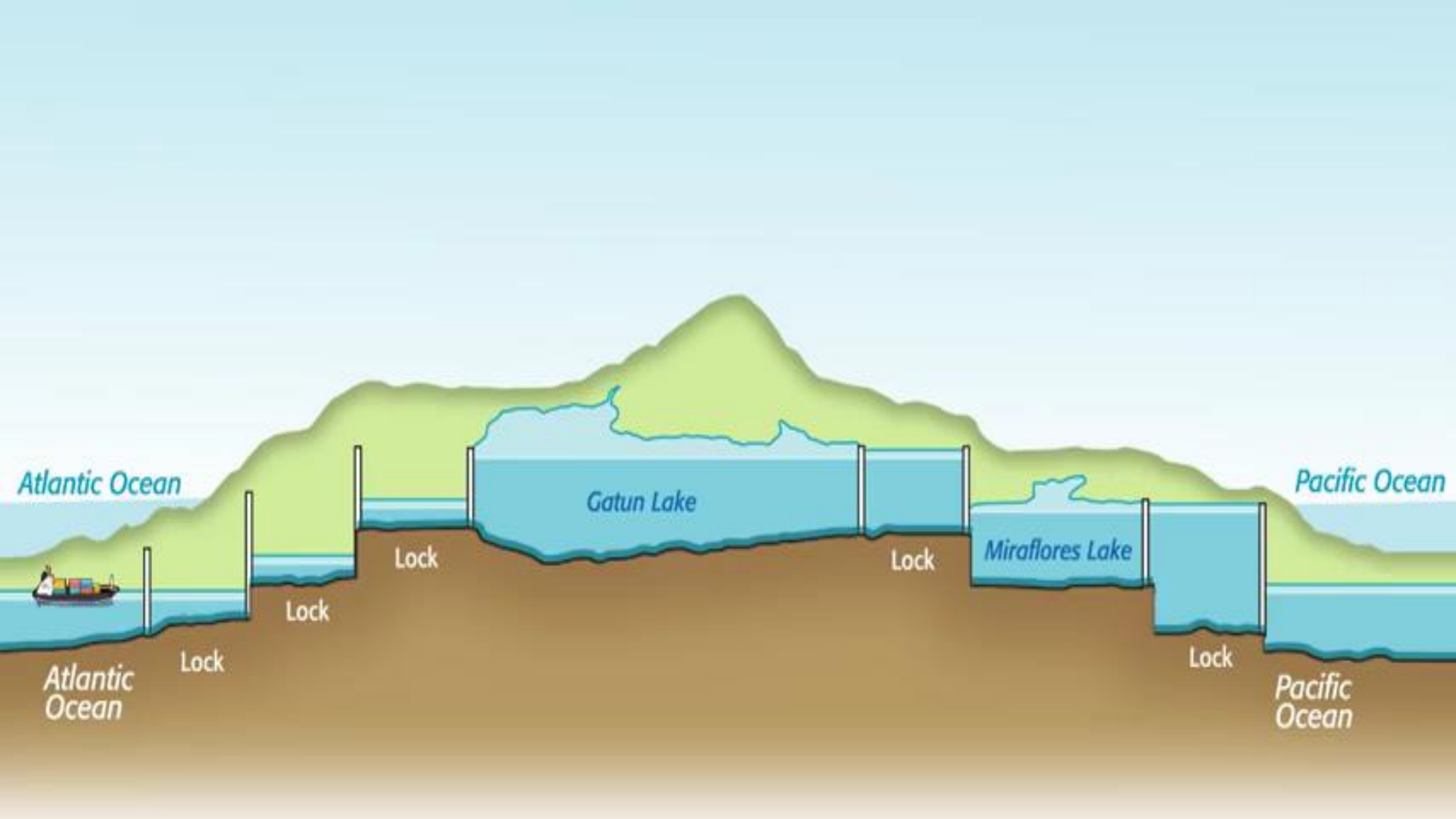


MODERN MARVELS OF CIVIL ENGINEERING

Palm Jumeirah:

- i. Foundation Lies In Land Reclamation, Where Millions Of Cubic Meters Of Sand & Rock Dredged From Arabian Gulf To Create Island's Structure.
- ii. Massive Breakwater Encircles The Island Protecting It From Harsh Marine Environment.
- iii. Soil Stabilization Was Crucial For Artificial Nature Of Island Preventing Soil Erosion & Subsidence.
- iv. Infrastructure Development Like Roads, Utilities & Drainage Systems Required Meticulous Planning & Execution.
- v. Environmental Ecosystem & Marine Life Were Taken Under Consideration To Minimize Damage .
- vi. Design Structure Which Can Withstand Harsh Desert Climate & Seismic Activity.





Panama Canal

- i. **Lock System:** It Is A Master Piece Of Hydraulic Engineering. Massive Chambers Raise & Lower Ships Between Water Levels.
- ii. **Gatun Lake:** Creation Of Artificial Lake Formed By Gatun Dam Which Acts As A Reservoir & Significant Portion Of Waterway.
- iii. **Excavation & Dredging:** Creating Canal's Channels Require Removal Of Millions Of Cubic Meters Of Earth & Rock .
- iv. **Geology & Soil Mechanics:** Understanding Panama Canal's Geology Was Crucial For Design & Construction.
- v. **Hydrology & Water Management:** Managing Water Levels & Flow Rates Within Canal Along With Complex Hydraulic Systems To Ensure Efficient Water Usage.
- vi. **Advanced Tunneling & Blasting Techniques:** They Were Used To Overcome Landslides Due To Continental Divide & Tropical Rainforest.



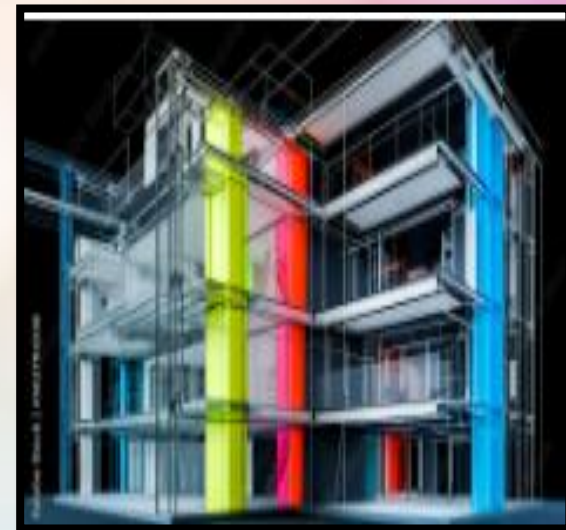
Burj Khalifa

- **Foundation:** Massive Concrete Raft Foundation Supported By Piles, Ensures Stability On Sandy Terrain. Y Shaped Configuration Provides Extra Stability.
- **Wind Loads:** Understanding Wind Patterns To Design A Structure Capable Of Withstanding Extreme Wind Forces.
- **Sustainable Design:** Incorporating Elements Like Solar Panels & Water Conservation Systems To Ensure Sustainability.
- **Vertical Transportation:** Developing High Speed Elevators To Transport People Efficiently To The Top Of The Building.
- **Material Usage:** High Strength Concrete To Withstand Immense Weight & Pressure Along With Extensive Use Of Steel Reinforces The Concrete Structure. Exterior Cladding Composed Of Thousands Of Individually Cut Glass Panels.

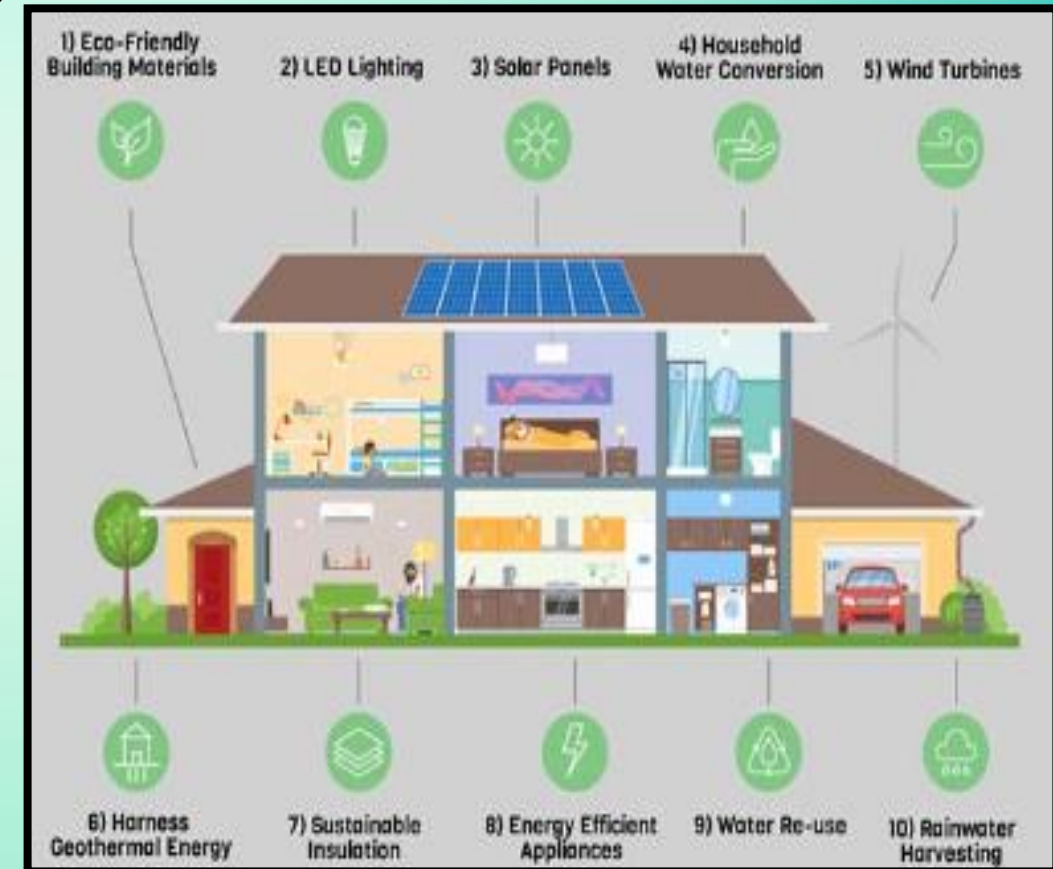


NEW WAYS AND METHODS IN MODERN CIVIL ENGINEERING

- **Building Information Modeling(BIM):** Digital Representation Of Physical Structure Transformed Design, Construction & Maintenance Processes.
- **Drones & Remote Sensing:** Used For Site Surveys, Monitoring Construction Progress & Inspecting Structures.
- **AI & Machine Learning:** Optimizing Designs, Predicting Material Behaviour & Managing Construction Schedules.
- **VR & AR:** Enhancing Design Visualization , Training & Site Supervision.



- **Sustainable Materials:** Using Recycled & Recyclable Materials To Minimize Waste.
- **Cross-laminated Timber:** Sustainable & Strong Alternative To Traditional Wood Construction.
- **Geosynthetics:** Improving Soil Stability & Drainage For Infra Projects.
- **Green Building Design:** Incorporating Energy Efficiency, Water Conservation & Renewable Energy Sources.



- **3D Printing:** Creating Complex Structures With Precision & Reducing Material Waste.
- **Modular Construction:** Prefabricating Building Components Off-site To Improve Quality.
- **Resilient Infra:** Designing Structures To Withstand Natural Disasters & Climate Change.
- **Advanced Materials:** Development & Utilization Of Materials Like Graphene, Carbon Fiber & Self Healing Concrete.



LESSONS FROM MODERN CIVIL ENGINEERING

- **Technological Integration:** Integrating Cutting Edge Technology Into Design & Construction Process. From BIM & AI To Drones & 3D Printing.
- **Data-driven Decision Making:** Use Of Data Analyst And Simulations Allow Engineers To Make Informed Decisions At Every Stage Of Project.
- **Sustainable Design & Construction:** Incorporating Environmental Considerations Into Every Aspect Of A Project From Material Selection To Energy Efficiency.
- **Resilience:** Structures Which Can Withstand Impacts Of Climate Change For Long Term Sustainability.



- **Adopting Circular Economy Principles** Can Minimize Waste & Reduce The Environmental Footprint Of Construction Projects.
- **Collaborative Approach** Among Diverse Teams, Including Engineers, Architects, Contractors & Stakeholders To Make Projects Successful.
- **Ensuring Reliable & Efficient Supply** Chain Is Crucial For Meeting Project Deadlines & Budgets.
- **Innovation & Creativity** Are Important To Make It Sustain Longer & Challenge Conventional Approaches.
- **Developing New Materials** With Enhanced Properties Can Lead To Groundbreaking Designs & Construction Methods.
- **Long Term Vision:** Considering Long Term Impacts Of A Project On Community & Environment Is Crucial For Creating Sustainable Landmarks.



THANK YOU