Topics 20ty century architecture (modernism) o Pioneers first generation o Frank Lloyd Wright o Le Corbusier o Mies Van Der Rohe o Walter Gropius Second generation Third generation o Archigram group o Post modernism 60th o High - Tech o Post Modernism o Deconstruction o Metabolism Research Topics o Smart architecture o Active envelopes o Dynamic - kinetic, Architecture o Bioclimatic Architecture o Biomimatec Architecture o Nano Architecture o Liquid - fluid ,Architecture o Biophilic Architecture o Artificial Intelligent o Net-Zero Energy o Parametric Architecture o Biomat Architecture ??????Notre Dame du Raincy 1922 Villa Kaufmann (Waterfalls) by Frank Lloyd Wright 1936 Exhibition Building, Turin, by Pier Luigi Nervi, at Turin, Italy, 1948 to 1949In the beginning of 19th century, many researches were done to know to what extend can the R.C. can bear the tension (firefighting - large spans - cantilevers - open plans - corner openings - shells and creative forms slim buildings). Reinforced concrete ? In1879, Ward - mechanical engineering- was the first one to use the R.C. to construct a complete building 'walls - beams - slabs' in his house in Philadelphia. ? Portland concrete invention added strength to the R.C. ? Official recognition of reinforced concrete in 1906. August Perret ?????? 1902 ????? ????? ????? ????? The French engineering Francois Hennebigue was the pioneer to spread the R.C. when he constructed his company in Paris which consists of 5 floors (thin walls - saved areas - heights - flexibility - interior light walls which can be modified). Shells were early used by 5-7cm thickness to construct a ceiling in a form of barrel vaults in some storages in Casablanca (1916), then in le Raincy Notre Dame church in Paris (1922) in a vertical design composition - precast unites .Art Nouveaux- Anto Nio Gaudi Architects divided at the end of the 19th century The constructions seized the opportunity of the controversy between the architects and constructed many industrial buildings and facilities with reinforced concrete, iron and glass. On the other side of the Atlantic, the Civil War in America was happened, which was an English colony for the exile of criminals, and North America was unified with the South, and became the richest capitalist in history, but rooted in a civilizational knot towards Europe with civilization and culture, which was held in the 19th century with the origins Classical architecture, and became the hope for the rich American to had houses, palaces and public buildings similar to the classics of Europe and this was done even in the first skyscrapers .Then The Chicago school group, which calls for a purely American architecture away from the European platform, the group was headed by the Adler & Sullivan and also Burnham & Root, and they successfully developed the design of high-steel buildings instead of thick walls - agility - Glass wide windows - almost devoid of decorations. Adolf Loos: Chicago Tribune competition entry, 1922 Reinforced concrete