What is Distress of Concrete?
Distress in concrete members occurs with age due to corrosion in reinforcement, loading, settlement of foundations etc. This distress in in building can be found by development of cracks in concrete members such as slabs, beams, columns etc.

The cracking of concrete in building is developed in three stages:
1. Stage – I: Volume of rust formed due to corrosion of reinforcement is increased about 2.5 times the volume of steel. With the result of corroded reinforcement bar presses the concrete outwards. Since concrete is poor in tension, longitudinal cracks are developed along the reinforcement bar.

2. Stage – II: Longitudinal cracks in RCC provide wide access to oxygen, carbon dioxide, and moisture with result excessive carbonation starts and structural damages starts. Fear in the mind of users starts.

3. Stage – III: In this stage cover comes out and causes danger to the life of structure and structure becomes unserviceable.

Remedial Measures for Distressed Concrete

1. At design stage
(i) Adequate cover to concrete should be planned. (ii) Adequate thickness of structural members particularly non-structural members e.g. chajjas, parapets, pergolas and fins etc. should be provided. (iii) Proper detailing of reinforcement specially at junctions should be designed to avoid congestion and to ensure smooth placement of concrete.

2. At the construction stage
(i) Concrete should be workable with minimum water cement ratio (< 0.45). It should be well compacted by vibrator. Thus we should try to achieve highest density with minimum void. (ii) Ensure proper grading and quality of aggregate free from deleterious material. (iii) Use potable water only. (iv) Leak proof and properly designed from work should be used. Ensure proper mixing, placement, compaction and curing of concrete. No segregation, honeycombing is allowed. (v) Use of plasticizers and super-plasticizers to achieve workability for controlled water-cement ratio in placement of concrete in congested conditions. (vi) Binding

wires to be turned inside (should not touch formwork). G.I. wires to be used in aggressive environment. (vii) Proper cover with dense concrete / mortar is must. (viii) Provision of drip course for projections should be made. (ix) Proper cement to be used to prevent sulphate and chloride attack. (x) Cement not more than 3 months old should be used.

3. Protection of reinforcement bars
Protection to reinforcement bars against corrosion can also be provided by:

(i) Using corrosion resistant steel
Constituents of steel alloy are adjusted to resist corrosion.

(ii) Fusion bonded epoxy coating

This process has good results in protecting reinforcement bars from corrosion. Powder epoxy is fusion bonded to bar at about 250^{0}C temperature. This is being used in coastal areas particularly in Mumbai in prestigious projects like Bridges, Flyovers, Shipyards and Jetties. Loss of bond is about 20%. IS:13620 – 1993 provides the specification for “Fusion Bonded Epoxy Coated Reinforcement Bars”.

(iii) Passive coating with polymer based cement slurry:

In this process, reinforcement bars are cleaned for rust and freshly prepared polymer cement slurry is applied by brushes.

(iv) Protective epoxy coating:

Certain epoxy coating are also available in the market. Firstly rust is removed by wire brush or sand blasting. Thereafter, epoxy as per manufacturer’s specifications are applied by spray / brush. Loss of bond may be upto 30%.