UNIT-I
MAINTENANCE AND REPAIR STRATEGIES

PART-A

1. Define Maintenance.

Maintenance is the act of keeping something in good condition by checking or repairing it regularly.

2. Define Repair.

Repair is the process of restoring something that is damaged or deteriorated or broken, to good condition.

3. Define Rehabilitation.

Rehabilitation is the process of returning a building or an area to its previous good conditions.

4. What are the two facets of maintenance? The

two facets of maintenance are

i) Prevention

ii) Repair

5. What are the causes of deterioration?

i) Deterioration due to corrosion

ii) Environmental effects

iii) Poor quality material used

iv) Quality of supervision

v) Design and construction flaws

6. Define physical inspection of damaged structure.

Some of the use full information may be obtained from the physical inspection of damaged structure, like nature of distress, type of distress, extent damage and its classification etc, their causes preparing and documenting the damages, collecting the samples for laboratory testing and analysis, planning for in situ testing, special environmental effects which have not been considered at the design stage and information on the loads acting on the existing structure at the time of damage may be, obtained. To stop further damages, preventive measure necessary may be planned which may warrent urgent execution.

7. How deterioration occurs due to corrosion?

- Spalling of concrete cover
- Cracks parallel to the reinforcement
- Spalling at edges
- Swelling of concrete
- Dislocation
- Internal cracking and reduction in area of steel reinforcement.

8. What are the steps in selecting a repair procedure?

- Consider total cost
- Do repair job in time
- If defects are few & isolated repair on an individual basis. Otherwise do in generalized manner
- Ensure the repair prevents further development of defects
- Incase of lost strength, repairs should restore the strength
- If appearance is a problem, the number of applicable types of repairs become limited & the repairs must be covered
- Repair works should not interface with facilities of the structure
- Take care in addition of section to a member and in restributing live loads and other live load moments. After selecting a suitable method of repairs, and after considering all the ramifications of its

application, the last step is to prepare plans & specification and proceed with the work.

9. Discuss about the environment effects which leads to deterioration of concrete structure.

Micro-cracks present in the concrete are the sources of ingress of moistures atmospheric carbon di-oxide into the concrete which attack reinforcement and with various ingredients of concrete. In aggressive environme4nt concrete structure will be severely reduces

10. What is the effect of selecting poor quality material for construction?

Quality of materials, to be used in construction, should be ensured by means various tests as specified in the IS codes. Alkali-aggregate reaction and sulphate attack results in early deterioration. Clayey materials in the fine aggregates weaken the mortar aggregate bond and reduce the strength. Salinity causes corrosion of reinforcing bars as well as deterioration of concrete.

11. How can we determine the cause for deterioration of concrete structure?

a) Inspect & observe the structure
b) Observe in bad & good weather
c) Compare with other constructions on the area or elsewhere & be patient
d) Study the problem & allow enough time to do the job

12. What are the factors to be considered by the designer at the construction site.

- Minimum and maximum temperatures
- temperature cycles
- exposure to ultra violet radiation
- amount of moisture
- wet/dry cycles
- presence of aggressive chemicals

13. What are the steps in repair aspect?

i. finding the deterioration
ii. determining the cause
iii. evaluating the strength of existing building or structure
iv. evaluating the need of repair
v. Selecting & implementing a repair procedure

14. Define the fixed percentage method of evaluating the strength of existing structure It is to assume that all members which have lost less than some predetermined

% of their strength are still adequate and that all members which have lost more than the strength are inadequate. It is usually from 15% onwards higher values are applicable for piling % stiffness bearing plates etc.

15. Discuss about the design and construction errors leading to deterioration of a structure.

Design of concrete structures governs the performance of concrete structures. Well designed and detailed concrete structure will show less deterioration in comparison with poorly designed and detailed concrete, in the similar condition. The beam-column joints are particularly prone to defective concrete, if detailing and placing of reinforcement is not done properly. Inadequate concrete cover may lead to carbonation depth reaching up to the reinforcement, thus, increasing the risk of corrosion of the reinforcement.

16. Discuss about the quality of supervision to be followed at a site.

Construction work should be carried out as per the laid down specification. Adherence to specified water-cement ratio controls strength, permeability durability of concrete. Insufficient vibration may result in porous and honey combined concrete, whereas excess vibration may cause segregation.

17. What are the possible decisions that can be made after evaluating the strength of a structure?

a. to permit deterioration to continue
b. to make measures to preserve the structure in its present condition without strengthening
c. to strengthen the construction
d. if deterioration is exceptionally sever, to reconstruct or possibly abandon it.

18. How can we evaluate the strength of existing structure by stress analysis?

This method is to make detailed stress analysis of the structure, as it stands including allowances for loss of section where it has occurred. This is more difficult & expensive. Here also the first stop is to make preliminary analysis by fixed percentage method and if it appears that major repairs will be required, the strength is reevaluated based on detailed stress analysis, considering all contributions to such strength

19. Define the load test method of evaluating the strength of existing structure.

Load tests may be required by the local building offered, but they should only be performed where computation indicated that there is reasonable margin of safety against collapse, lest the test bring the structure sown. Load test show strengths much greater than computed strengths when performed on actual structures. When performed on actual structures. In repair work every little bit of strength is important.

20. What are the possible decisions after finding a structure to be inadequate?

- if the appearance of the existing condition is objectionable – repair

now

- if appearance is not a problem then
- Put the condition under observation to check if it is dormant or progressive.
- if dormant – no repair
- if progressive – check the feasibility & relative economics of permitting deterioration to continue and performing a repair at some later date & of making the repair right away

PART-B

1. Describe the steps in the assessment procedure for evaluate damages in a structure.

2. Explain the various causes for deterioration of concrete structures.

3. Describe in detail about the prevention aspect of maintenance.

4. Describe in detail about the repair aspect of maintenance.

5. Explain in detail about the permeability of concrete.