

the economic life may be compared to the value of the site on which the building is situated.

The most important decision to be taken is, to carry out building work, adaptation work, or maintenance work, based on the life and cost of building work. The technique which can be employed to assess the economic life of a building is discounting. **Discounting** is method of calculating the present value of a sum of money due in the future. Discounting is basically the **reciprocal of compounding**. Discounting brings all the moneys involved in the project or proposal to a common base which is usually taken at its current or prevailing **value**.

Thus the appraisal of all the proposals can be made and a decision in regard to adoption of a particular proposal, based on economic soundness, can be made.

1.9 CONCLUSION

To conclude it can be said that regular and planned maintenance of buildings is of vital importance. Planned maintenance goes a long way in preserving building's longevity, durability and serviceability. Maintenance is a continuous process which start from commissioning of the building and continues till the building acquires a state beyond economical repairs.

Premature loss of property occurs due to **ignorance, negligence or abuse of building**. Deteriorated buildings create unhealthy environment and unsound health of occupants which ultimately result in loss of productivity of people. Lack of repair and maintenance of buildings would further entail a huge cost on replacement at a later stage. Like longevity of human life, building life longevity also depends on timely and appropriate treatment of ailment and maintenance of building health and serviceability. Serviceability and health of a building can be enhanced by suitable repair and preventive maintenance and treatment commensurate with attacking environment. Building structures should not be abused by indiscriminate **over loading** and **over stressing** without suitable rehabilitation works.

The topic of maintenance of serviceability of buildings is of universal importance and gigantic in nature as the cost of maintenance, repair and rehabilitation runs into many thousands crores of rupees. Enhancement of **durability, longevity and serviceability** of building structures depend upon **careful design, sound construction, good workmanship** and continuous maintenance.

Invention of new protective materials have made maintenance a highly controlled and scientific process. Well planned maintenance goes a long way in preserving our coveted structures and buildings.

1.10 SUMMARY

Since the inception of civilization, many beautiful monuments and intricate structures have been constructed. Few of them have however retained their glamour and serviceability. In order to keep these structures in good condition, one has to think about the steps needed for their repair and maintenance.

adaptation works. Preparation of a Maintenance Manual will go a long way in ensuring proper maintenance of a building and keeping the same in operational condition, at the most economical cost as a result of clarity in the information and communication system right from the design stage.

2.5 PROPERTY INSPECTION AND REPORTS

Inspections of buildings and their fixtures are carried out for a number of reasons and purposes. The purpose of these inspections must be established before commencement for obtaining necessary information required to prepare an acceptable report. The inspection form should be designed to ensure that as far as practicable there are no omissions in the report. Different types of inspections may be listed, as below:

- Complete building inspections or survey
- Inspection to rectify
- Planned inspections
- Control inspections.

Inspections form the basis for deciding on the nature and type of maintenance. Building inspections also provide appropriate data for budget estimates, type of maintenance work force and urgency of maintenance.

2.5.1 Complete Building Inspection or Survey

This form of inspection is usually carried out to obtain a complete and accurate **record of the property**, its service and fixtures. This inspection would normally be carried out where such data does not exist, particularly at the beginning of a lease or prior to sale/purchase. The inspection needs to be carried out by an experienced surveyor, specially in the case of older buildings with good knowledge of similar type of construction. The information should be gathered in such a manner that when finally presented, errors and omissions are negligible.

The building should be measured with a tape and using **running dimensions** to reduce the risk of cumulative errors which can easily occur if the process of 'piece meal' measuring is adopted. All fittings, fixtures, services, and any other features must be noted and measured to obtain their position and size.

A written report should also be prepared to indicate the condition, need for repair or any other items in need of attention and protection. The report should be submitted with the required drawings. The drawings may be presented in the form of fully dimensioned and annotated working drawings or, alternatively, as measured drawings without dimensions or annotation but including a drawn scale. Complete building inspection facilitates preparation of **standard measurement book** with bill of quantities (BOQ) required again and again during maintenance.

2.5.2 Inspection to Rectify

This form of inspection is carried out by the operational field staff. The inspection may well be planned according to timing or carried out as the result of a request from the user.

- (c) Directing, guiding and motivating maintenance team
- 2.5 Explain main functions of maintenance team
- 2.6 Describe briefly type of maintenance work force and advantages of each.
- 2.7 Explain briefly need for communication and information system in maintenance.
- 2.8 Explain briefly importance of specifications in building maintenance.
- 2.9 List type and purpose of property inspections.
- 2.10 Differentiate between :
 - (a) Planned inspection and inspection to rectify
 - (b) Building inspection and control inspection
- 2.11 Explain the purpose of maintenance budget estimates.
- 2.12 List the factors considered in preparation of maintenance budget estimates.
- 2.13 Describe briefly important clauses included in maintenance specifications.
- 2.14 Describe important provisions of "the health and safety - Act 1974" in relation to maintenance job.
- 2.15 Explain how quality of building maintenance affects production in any organisation.
- 2.16 Explain how maintenance of building elements affects serviceable life of a building.
- 2.17 Differentiate between preventive and corrective maintenance
- 2.18 Describe importance of preventive maintenance.
- 2.19 Explain the need for maintenance manual.

3.2.10 Inappropriate Cleaning

Maintenance starts with cleaning activity by considering some questions and issues. How easy is it to clean? How fast will it become dirty? It must be taken into consideration to reduce the effect of agencies causing deterioration. Improper/inadequate cleaning may be due to:

- Failure to carry out routine cleaning operations;
- Use of **incorrect cleaning materials/techniques**;
- Inadequate supervision to carry out **effective cleaning**;
- Insufficient time or **incorrect equipment** used for cleaning operations;
- Failure to employ specialists for cleaning special fittings and equipment.

3.2.11 Misuse of Buildings

Lack of security, lack of awareness among occupants of the consequences of deliberate vandalism; and failure to repair the areas damaged by vandalism. These are some of the causes which become sources of deterioration in structures. Balatant abuse and misuse of building, its fittings, furnishing and finishes may result in deterioration.

3.3 EFFECT OF DETERIORATION OF MATERIALS

Knowledge of various causes and sources of decay and deterioration is necessary to plan prevention of faster deterioration of structures. It is also necessary to understand the effects of various agencies causing deterioration of building materials to take proper protection against these agencies. The choice of material is governed by its:

- (i) Ability to withstand the effect of climate;
- (ii) Ability to fulfil the designed functions;
- (iii) Reaction with surrounding material;
- (iv) Ease of maintenance and/or replacement;
- (v) Overall economic acceptability.

The materials which have acceptable physical, chemical and economic advantages may be selected. To carry out analysis, one must know how the various materials deteriorate. The effect of various agencies of deterioration on major materials is briefly discussed in subsequent paragraphs. The designer's task is to find an effective solution to the above factors.

3.3.1 Bricks and Clay Products

Clay products which can be used on external surfaces include roofing tiles, coping, terracotta tiles and bricks. Generally all bricks and clay products have good durability. Most common effect of weathering on these products is change in appearance. Usually these materials give a dry look.

The most common form of crystallization of soluble salts in the context of clay products and brickwork is of efflorescence. **Efflorescence is white surface deposit of salts** in the

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