# IQRA NATIONAL UNIVETSITY, PESHAWAR

## DEPARTMENT OF CIVIL ENGINEERING

## FINAL TERM EXAMINATION

Subject: Material Testing Repair & Maintenance

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Q No 01(a) Define Maintenance; Briefly describe facets.

Ans

## Maintenance

It is the act of maintenance the Building in the its Serviceable condition. It is defined as the work done to keep the civil engineering Structures and work in Condition so as to enable them to carry out the functions for which they are Constructed. the maintenance of Structure is done to meet the following

1) prevention of damages due to natural agencies and to keep them in a good appearance and working condition

2) Repair of the defects occured in the Structure and Strengthen them, if necessary.

## Facets of Maintenance

Maintenance operation have many facets

Emergency Maintenance: Necessitated by unforesen breakdown drainage or Damage caused by natural like fir, floods, cyclone earthquake etc.

* Condition Based Maintenance:
Work initiated after due inspection
* Fixed Time Maintenance:
Activities Repeated at predetermined intervals of time.
* Preventive Maintenance: This is intended to preserve by preventing failure and detecting incipient fault.
* Opportunity Maintenance:
work did as when possible within the limits of operation demanded.
* Day-to-Day care and Maintenance
Through overhaul and maintenance after closing a facility.
* Shut Down Maintenance:
Through overhaul and maintenance after closing a facility
* Improvement plans: This is essentially Maintenance operation wherein the weak links in the original construction Replaced

Q.No.01 (B) Explain the Neccessitation of the maintenance

Ans (B) Neccessitation of The Maintenance:

Atomospheric Agencies, Normal weard and tear, Failure of the Structure

∴ Atomospheric AGENCIES:

Rain: It is the important Source of wates which affects the Structure in the following ways

Physical: Dissolving and Carrying away minerals as its it universal Solvent

Expansion and Corstruction: The materiel is Subjected to Repetative expansion and Corstruction while they become wet and dry and develops Stresses

Expansion of wates: The variation of temperature Causes the expansion and Corstraction of absolbed wates and affects the micro Structure of the materiel:

ERosion: Transportation and attrtion and ablasion of the materiel is quite evident effect of the wates

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Normal Wear and Tear:

During the use of Structure it is subjected to abrasion and thereby it looses appearance and serviceability.

Failure of Structure:

Failure is defined as behaviour of Structure not in greement with expected condition of stability & lacking freedom from necessary Repair or non Compliance will desired use of and occupancy of the Completed Structure.

Improper design,

Defective Construction,

Improper use of Structure.

Lack of Maintenance

Q.2 (a) What is meant by inspection of period. & Briefly describe stages of inspections

Pre-Monsoon period:-
The decide the maintenance programme to be done Before monsoon such as Cleaning of drains, Checking of Roof Leakage, Collection materials etc.
Claning of drains Checking of Roof leakage Collection of materals and equipments Require during moonsoon Repair Bridge' and other Structur.

Monsoon Period
It is needless to mention that the emergency work Carried out in moonsoon period. Example. Railway tracks Collaps of roof etc. washing ways of Road, Rilway tracks and Failure of wall.

Post-Moonsoon period.
It is made to repair the damaged caused by water draw up the programe of Repair according to the priorities

# Stages of Inspection:

A:: Inspection:
Collect data at specified interval in specified form.

B:: Analysis:: Add latest information to database
Examine progression of defects. Relate defects to action criteria

C:: Action possibilities
Note and wait for the next inspection
Alter inspection frequency. institute Repairs
Further detailed investigation
Put Safety procedures in place.

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No 62 (B) What are the causes of Building Collaps? Briefly describe the role of cracks and Corrosion effect in the collaps of Building.

Ans:

## Causes of Failure

The causes of Building collaps can be classified under certain head Cracked and Corrosion, Thermal change Bad Design, Faulty Construction, Foundation failure, fire accidents and many more

## Cracks & Corrosion

A properly designed and Constructed Concrete is initially water-tight and the Reinforcement Steel within its well protected by a physical Barrier of Concrete Cover which has Low Permeability and high density Concrete also give Steel within it is a Chemical protection. Steel will not Corrod as long as Concrete around it is penetrate within the Cover area.

Steel corrosion will also not occur as long as Concrete Surrounding it

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Q No 03 (a) what is meant ~~Faultity~~ const ruct
Brefly describe insufficient Faulty
beam – colum Joint Support.

Ans ⇒ Faulty Construction perhaps is the most import and cause of structural failural. the Lack of proper Construction Supervision and timely inspection by engineer & Architect is a key Contributin Some faulty practices to be firmly Checked and Stoped are the use of Salty Sand to make Concrete the Subsitituion of inferior Steel for that Specified, Bad riveting improper tighening torque on nuts excessive use of the drift pin to make holes line up, Bad Welds and all Such practices well known as taboo in Construction field.

1) original position
2) Column head displaced laterally
Lower Beam flange yields
Web begains to buckle,
Joists began to disconnect.

Q No 03 (B) Elaborate Foundation failure. What are the main causes of Foundation failure.?

Ans

Houses and Commercial Buildings usually look very Solid. Built with Concrete and Beam its hard to imagine what Could cause them to crack and shift other than an each Earthquake A Foundation rightly designed is a pre-requisite for every Structure to stand is Earth beneath the Building Should be that Structures loads can be sustained.

There are many causes of Foundation failure so the main are These

i) Soil type - especially expansive clay soil
ii) Poorly Compacted fill material
3) Slope failure mass wasting.
4) Erosions 5) poor construction

Q No 04 (a) Describe the Role of FIR Accidents in the collaps of Buildings

Ans Fire affects Concrete in extreme ways, Some of which are listed below

=> Uneven volume Change in affected members :: Resulted in Distortion, Buckling & Cracking.

Spalling of rapidly expanding concrete Surfaces from extern heat near the Source of fire. Some aggregates expand in Bursts, Spalling the adjust materia Moisture rapidly changes to Steam causing localized Bursting of Small Pieces of Concrete. The cement mortar. The Cement mortar Converts to quick lime at temperatures of 400° thereby causing disintegratio of Concrete. Reinforcement steel Losses tensile capacity as temperature Rise. once the reinforcing steel is exposed to the Spalling action, Steel expands more rapidly then the Surrounding Concrete. Steel expands

Q No 04 B Differentiate b/w Structural failure and economic failure.

Ans

## Structural failure

This failure is a breakdown in one or more components of the structure systems. Such failures include common concrete cracking which may or may not be of any consequences depending upon the degree of the failure. In addition structural failures do not always require correction and in structural failure without some functional failure or impairment is of limited value. Furthermore the failure of structural steel connection caused by a design defect could be catastrophic and demands immediate attention.

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## Economic Failure

This is a Condition that result in economic loss or the need to expand unplanned moves to keep a structure, component or system in orders the loss could take the form of excessive maintenance shortened useful life or added repairs. The installation of improper Bearing in an organ can Result in the economic failure of the equipment.

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Q.No — 08 Define following failure of ~~Concrete Structure~~.

i) Failure of Concrete Structure.
ii) Component failure,
iii) ~~Fundamental~~ failure,
iv) Non-progressive failure,
v) Progressive failure.

Ans (S) =>

i) Failure of Concrete Structure:
When the mix components such as cement sound and coarse aggregate are of less value or standard, if there are a tendency that the concrete structure will fail because of the inadequate mix ratio of the component

=> Component Failure:
Building Components tends to fail depending on materials designs method of construction, environmental conditions and the use to which the Building is put.

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3 Foundation Failure

Foundation failure can cause the Building to collaps Foundation is the best first element of Building where the Construction starts But it fails it can cause of many defects in the Building including failure or collapes of Building.

Non-progressive Failure

Non-progressive failure or condition is one that is not likely to deteriorate Generally the non-progressive failure of an under-specified Component such as Building insulation can Result from design.

Progressive Failure

This type of failure is one that is likely to worsen over time. in the legal and insurance fields a progressive failure that is the Basis of a defective work claim is often described as a continuos Defects such as expansive soil under a failure basmant slab, can use Structural and progressive slab failure and may need be corrected