

**THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATION COUNCIL
DIPLOMA IN TECHNICAL EDUCATION EXAMINATION**

783

BUILDING CONSTRUCTION

Time: 3 Hour.

ANSWERS

Year: 2005

Instructions

1. This paper consists of sections **five (5)** questions.
2. Answer all questions.
3. Each question carries **twenty (20)** marks.
4. Non-programmable calculators may be used.
5. Communication devices and any unauthorized materials are **not** allowed in the examination room
6. Write your **Examination Number** on every page of your answer booklet.

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1. (a) Define the term “structural integrity” and explain its relevance in building construction.

Structural integrity refers to the ability of a structure to withstand its intended loads without failure or excessive deformation throughout its service life. It ensures that the building remains safe, stable, and usable under both normal and extreme conditions.

In building construction, structural integrity is crucial because it protects lives and property by ensuring that the structure performs safely under the weight of its components, occupants, environmental forces, and unforeseen loads such as wind or earthquakes.

(b) (i) Identify three factors that influence structural integrity during construction.

One factor is the quality of construction materials used. Substandard or non-compliant materials weaken the structure and reduce its capacity to support loads.

Another factor is adherence to structural design and reinforcement details. If the contractor deviates from the design, the building may not perform as intended under stress.

A third factor is workmanship and supervision on site. Poor construction practices, lack of skilled labor, or weak supervision can compromise the strength and alignment of structural members.

(ii) Explain two consequences of neglecting structural integrity in high-rise buildings.

Neglecting structural integrity can result in progressive collapse, where failure in one part of the building triggers the collapse of adjoining sections, leading to large-scale destruction.

Another consequence is excessive deformation or cracking, which may not immediately collapse the building but leads to long-term instability, water ingress, and safety risks to occupants.

(c) Describe three strategies used by engineers to ensure long-term structural performance of buildings.

Engineers use accurate load analysis and structural calculations to design members that resist all expected forces, including live, dead, wind, and seismic loads.

They specify durable materials and protective treatments, such as corrosion-resistant steel and waterproof coatings, to prolong structural lifespan.

Engineers also implement regular inspection and maintenance plans, ensuring that any deterioration or damage is identified and corrected early to maintain safety and function.

2. (a) What is a construction work schedule?

A construction work schedule is a document or tool that outlines the sequence, duration, and timing of all construction tasks and milestones. It serves as a roadmap for project execution, helping teams manage resources, time, and dependencies effectively.

(b) (i) State four types of construction schedules used in project planning.

The bar chart (Gantt chart) displays activities on a timeline, showing when each task starts and finishes.

The critical path method (CPM) identifies tasks that directly affect the project completion date, helping managers focus on critical activities.

The PERT (Program Evaluation and Review Technique) chart uses probabilistic time estimates to plan and monitor tasks under uncertain conditions.

The line of balance (LOB) schedule is useful for repetitive tasks, such as floor-by-floor construction in high-rise buildings.

(ii) Explain the importance of updating the schedule regularly during the project lifecycle.

Regular schedule updates allow the project team to track actual progress against the plan, identify delays early, and take corrective action.

It also ensures better coordination among trades and suppliers, reducing the chance of idle time or material shortages on site.

Updating the schedule reflects any design changes, variations, or unforeseen site issues, keeping the plan realistic and relevant.

(c) Give three effects of poor scheduling on construction project outcomes.

Poor scheduling can cause project delays, where tasks are not completed on time, leading to missed deadlines and penalties.

It leads to resource conflicts and inefficiency, such as overlapping work areas, labor idle time, or equipment shortages.

Poorly managed schedules also increase project costs, as delays, rework, and overtime may become necessary to recover lost time.

3. (a) Explain the term "contractual risk" in construction projects.

Contractual risk refers to the possibility of financial loss, dispute, or legal complication arising from the terms and performance of a construction contract. It involves risks related to scope, time, quality, and responsibilities not being met as agreed.

(b) (i) Mention three common sources of contractual risk.

One source is ambiguity or incompleteness in the contract documents, which leads to misunderstandings between parties.

Another source is scope creep, where additional work is demanded without clear agreement or compensation.

Delayed approvals or payments from the client can also create financial strain and lead to disputes or project suspension.

(ii) State two methods of mitigating contractual risks before project commencement.

One method is to engage legal and technical experts to review the contract and ensure clarity and fairness in all clauses.

Another is to conduct pre-contract meetings to discuss scope, deliverables, timelines, and responsibilities, aligning expectations among stakeholders.

(c) Describe three consequences of failing to manage contractual risks properly.

Unmanaged risks often lead to disputes and legal claims, which can stall the project and damage relationships between parties.

They result in financial losses, especially when contractors incur costs that were not budgeted or agreed upon due to unclear scope or delays.

Contractual failures can also harm a company's reputation, making it harder to win future projects or maintain client trust.

4. (a) Define the term "material specification" and explain its significance in procurement and site work.

Material specification is a detailed description of the quality, performance, and standards of construction materials required for a project. It includes type, size, grade, finish, and compliance standards.

It is significant because it ensures materials purchased meet design and safety standards, prevents misuse of substandard materials, and maintains consistency across all works.

(b) (i) List three types of material specifications and describe their application.

Descriptive specifications provide details about material properties and installation methods without naming specific brands.

Performance specifications focus on the required outcome or behavior of a material, allowing contractors to choose suitable products.

Proprietary specifications name exact brands or products to be used, ensuring compatibility or consistency, especially for finishes or technical systems.

(ii) Give two reasons why materials must comply strictly with approved specifications.

Compliant materials ensure the structural and functional integrity of the project, reducing the risk of defects or failure.

They also meet regulatory and safety requirements, protecting the contractor from legal consequences or penalties.

(c) Outline three challenges encountered when materials delivered on site do not match specifications.

Rejection of materials causes delays, as replacement orders may take time and halt progress on affected works.

Disputes may arise between the supplier and contractor or contractor and client, affecting project relationships and progress.

If used unknowingly, non-compliant materials can result in costly demolition and rework, especially after inspections or testing reveal quality failures.

5. (a) What is post-construction maintenance?

Post-construction maintenance refers to the regular inspection, servicing, and repair of building components after construction is complete and the facility is in use. Its purpose is to preserve the building's function, safety, and appearance.

(b) (i) State four types of post-construction maintenance activities.

Preventive maintenance involves scheduled servicing of systems such as HVAC, plumbing, and fire safety.

Corrective maintenance addresses faults or failures after they occur, such as fixing leaks or repairing damaged finishes.

Routine cleaning and upkeep of common areas, windows, and sanitary fittings ensures hygiene and usability.

Upgrades or replacements of aging systems or outdated finishes help maintain modern functionality and efficiency.

(ii) Explain the importance of maintenance manuals for facility users and managers.

Maintenance manuals provide clear instructions on equipment servicing, replacement intervals, and emergency procedures, ensuring efficient management.

They help prevent misuse or neglect by educating users on system limitations and required care, thus extending service life and reducing costs.

(c) Identify three long-term consequences of ignoring scheduled maintenance in public buildings.

Lack of maintenance leads to rapid deterioration, making the building unsafe or unusable for occupants.

It causes higher future costs, as unaddressed issues worsen and require major repairs or full replacements later.

Neglected facilities often result in poor public perception and reduced service delivery, especially in schools, hospitals, or government offices.