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BUGESERA DISTRICT

**TSS 2nd TERM DISTRICT COMPREHENSIVE ASSESSMENT
SCHOOL YEAR: 2024-2025**

SECTOR: Construction and building services

...../100 MARKS

TRADE: Building construction

RQF LEVEL: 3

MODULE CODE AND TITLE: BDCCM301 : Fundamentals of building materials.

DURATION: 3hours

DATE: / / 2025

INSTRUCTIONS TO CANDIDATE:

- ✓ **This exam has three sections.**
- ✓ **Maximum marks.../100Marks**
- ✓ **Attempt all Questions in A**
- ✓ **Choose only two questions in section B.**
- ✓ **Choose only one question in section C.**

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SECTION A: Attempt all Questions /55marks

Q1. What do you understand about “dead wood”? **/2marks**

ANSWER:

- Dead wood: Timber obtained from dead standing tree. **/2marks**

Reference L.O.1: Identify natural building construction materials.

Indicative content 1.4. Adequate construction timber is described according to the use.

Q2. Answer True or false **/4marks**

- a. Pith is the inner annual rings surrounding the pith.
- b. Outer bark is thin layer of sap between sapwood and inner bark.
- c. Medullary rays the thin radial fibres extending from pith to cambium layer.
- d. Sap wood the outer annual rings between heartwood and cambium layer.

ANSWER:

- a. False (F) **/1mark**
- b. False (F) **/1mark**
- c. True (T) **/1mark**
- d. True (T) **/1mark**

Reference L.O.1: Identify natural building construction materials.

Indicative content 1.4. Adequate Construction Timber is described according to the use.

Q3. Fill the sentences below by using the following words: seasoning timber, natural seasoning of timber, water seasoning, air seasoning, kiln seasoning, diagonal grain, and heart rot. **/5marks**

- a..... this is formed when branch has come out of a tree and the tree becomes weak and gives out hollow sound when struck with a hammer.
- b. due to improper sawing of timber.

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c..... is the process in which timber is immersed in water flow, which helps to remove the sap present in the timber.

d. In the process of timber logs are arranged in layers in a shed.

e. is the process by which moisture content in the timber is reduced to required level.

ANSWER:

- a. heart rot /1mark
- b. diagonal grain /1mark
- c. water seasoning /1mark
- d. air seasoning /1mark
- e. seasoning timber /1mark

Reference L.O.1: Identify natural building construction materials.

Indicative content 1.4. Adequate Construction Timber is described according to the use.

Q4. Which instruments are used to determine the standard consistency of a cement paste, as well as its initial and final setting time? /2marks

ANSWER:

- Vicat's apparatus plunger having 10mm dia. /2marks

Reference L.O. 2: Identify industrial building construction materials

Indicative content 2. 1: proper building construction cement is described according to the standards.

Q5. Choose the letter corresponding to the correct answer in each statement: /4marks

1. The following are the functions of cement, except
 - a. Making joints for drains, pipes.
 - b. Manufacture of pre cast pipes, piles, garden seats.
 - c. It should be able to retain its colour and shine.
 - d. Construction of telephone cabins, lampposts.
2. Which of the following is NOT a desirable property of cement
 - a. Consistency
 - b. Soundness
 - c. Sulphur trioxide
 - d. Bulk density

ANSWER:

1. **C.** It should be able to retain its colour and shine. /2marks
2. **c.** Sulphur trioxide. /2marks

Reference L.O. 2: Identify industrial building construction materials

Indicative content 2. 1: proper building construction cement is described according to the standards.

Q6. Illustrate any four (4) ingredients of paint and varnish used in construction.
/4marks

ANSWER :

Base: is a solid substance in a fine state that forms the body of paint. /1mark

Vehicle: is the liquid substance that holds the ingredients of paint in liquid suspension. /1mark

Pigments: The pigment is the actual colouring substance of paint. /1mark

Solvents: Makes the paint thin and helps for easy application

Driers: drier is the material that will stimulate or accelerate the hardening or curing of the film formers that will contain oxidizable or drying oil components in the paint.

Adulterants /1mark

Reference: LO2: Identify industrial building construction materials

Indicative content: 2.3: Convenient building construction paint and varnish are described according to the standards.

Q7. Outline any three (3) merits of oil paint. /3marks

ANSWER:

1. Durability and Longevity (1mark)

- Oil paints form a tough, hard-wearing surface that resists wear and tear over time, making them ideal for high-traffic areas and surfaces exposed to the elements.
- They are more resistant to cracking, peeling, and fading compared to some other types of paints.
- Oil-based finishes typically last longer, which can reduce the need for frequent touch-ups and repainting.

2. Excellent Adhesion /1mark

- Oil paint provides excellent adhesion to a variety of surfaces, including wood, metal, plaster, and concrete.
- It penetrates deeper into the surface, creating a strong bond that enhances its durability and resistance to moisture.

3. Smooth Finish and Gloss /1mark

- Oil-based paints dry to a smooth, glossy finish, which is not only aesthetically pleasing but also makes cleaning easier.
- The glossy finish is ideal for surfaces like doors, windows, and trim, as it gives a polished and professional appearance.
- The smooth texture is also less prone to dirt and grime build-up, making it ideal for high-visibility areas.

4. Water Resistance

- Due to their oil-based nature, these paints have good moisture resistance, making them suitable for areas exposed to high humidity or water, such as kitchens, bathrooms, and exterior surfaces.
- Oil paints are less prone to damp damage than other types of paints, such as water-based acrylics.

5. Stain Resistance

- Oil paints are highly resistant to stains and can be wiped clean without damaging the finish.

- This makes them an excellent choice for areas prone to dirt, grease, or fingerprints, like kitchen cabinets or doorframes

Reference: L.O.2: Identify industrial building construction materials

Indicative content: 2.3: Convenient building construction paint and varnish are described according to the standards

Q8. Differentiate thermoplastic from thermosetting and give any two (2) examples for each. **/4marks**

ANSWER:

Thermoplastic

/2marks

The term 'thermoplastic' refers to plastics that do not undergo any chemical changes when subjected to high temperatures. These plastics do not undergo any changes in their chemical structures and chemical compositions when subjected to heat and can be changed into a soft state and remolded multiple times. Examples: Polystyrene, Teflon, Acrylic, Nylon, While

Thermosetting

/2marks

They are also known as thermosets, and are plastics that can be molded only once and do not change shape on applying heat. These plastics can only be molded once and they cannot be softened on further heating. These plastics undergo degradation and become damaged when exposed to a large amount of heat. Examples: Vulcanized rubber, Bakelite, Polyurethane, Epoxy resin, Vinyl ester resin, etc.

Reference: L.O.2: Identify industrial building construction materials

Indicative content: 2.4: Adequate construction plastics materials are described according to the standards.

Q9. What do the following abbreviations stand for ? **/2marks**

a. PVC

b. HDPE

ANSWER:

a. **PVC** : Polyvinyl chloride **/1mark**

b. **HDPE** : High density polyethylene **/1mark**

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Reference: L.O.2: Identify industrial building construction materials

Indicative content: 2.4: Adequate construction plastics materials are described according to the standards.

Q10. Mention any five (5) applications of plastics in building construction. **/5marks**

ANSWER

Applications of plastics in building construction

1) Flooring /1mark

Plastic materials like polyethylene and PVC are widely used to manufacture flooring that is less prone to wear and tear. Moreover, it also decreases the level of sound pollution and can be easily cleaned.

2) Roofing /1mark

Two layers of plastic materials are used to ensure that there is no damage to the roof. One layer of plastic, which is the upper part, is made of thermoplastic olefin or vinyl, whereas the lower part is made of polyurethane foam. These plastic materials consume less heat and ensure that the interior of the house is kept cooler.

3) Insulation / 1mark

Polyurethane spray is frequently used for insulation when constructing green or low-energy buildings. Rigid polyurethane foam is known for its high thermal resistance which promotes temperature consistency. Polyurethane foam is also popular because it is lightweight, chemical resistant, and flame retardant. Due to its closed-cell nature, polyurethane insulation performs as an air barrier, resulting in significant energy savings.

4) Pipes /1mark

Pipes that are used in construction are commonly made from polyethylene, PVC, acrylonitrile butadiene styrene (ABS), and CPVC. They are known for being extremely lightweight and flexible, making them easy to install. They are also water and chemical resistant, making them ideal for harsh environments.

5) Windows /1mark

Compared to regular glass windows, polycarbonate is known for being more burglar-proof. Plastic materials like fiberglass and vinyl are also used to manufacture window

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frames. Vinyl is extremely inexpensive and strong, whereas vinyl is known for its impact resistance.

6) Doors

Many construction projects use polyurethane foam with a fiber-reinforced plastic (FRP) coating for manufacturing doors. This structure makes them incredibly strong.

Reference: L.O.2: Identify industrial building construction materials

Indicative content: 2.4: Adequate construction plastics materials are described according to the standards.

Q11. Compare the defects in timber due to fungi from due to natural forces. / **4marks**

ANSWER:

- a) **Defects due to fungi:** The attack of timber by fungi when moisture content of timber is above 20% and presence of air and warmth for the growth of fungi the following defects are caused /**2marks**
- b)
- (i) **Blue stain:** Sap of wood is stained to bluish color
 - (ii) **Brown rot:** Decay or disease of timber by removal of cellulose compounds from wood and wood assumes the brown colour
 - (iii) **Dry rot:** Convert the wood into dry powder form
 - (iv) **Heart rot:** This is formed when branch has come out of a tree and the tree becomes weak and gives out hallow sound when struck with a hammer
 - (v) **Sap stain:** The sap wood loses its colour because of feed on cell contents of sap wood.
 - (vi) **Wet rot:** Caused chemical decomposition of wood of the timber and timber converts to grayish brown powder known as wet rot.
 - (vii) **White rot:** Attack lignin of wood and wood assumes the appearance of white mass .

c) **While Defects due to natural forces:**

The main natural forces responsible for causing defects in timber are abnormal growth and rapture of tissues **/2marks**

- (i) **Burls:** Irregular projections appear on the body of timber because of shock at younger age
- (ii) **Callus:** Soft tissue or skin, which covers the wound of tree.

Reference L.O.1: Identify natural building construction materials.

Indicative content 1.4. Adequate Construction Timber is described according to the use.

Q12. Moisture content or dampness is the main hazard for the cement. Mention any four (4) Precautions for Proper Storage of Cement. **/4marks**

ANSWER:

Four (4) Precautions for Proper Storage of Cement

- Atmospheric moisture content **/1mark**
- Duration of cement storage **/1mark**
- Place of storage **/1mark**
- Arranging cement bags **/1mark**
- Withdrawal of cement bags

Reference L.O. 2: Identify industrial building construction materials

Indicative content 2. 1: proper building construction cement is described according to the standards.

Q13. What are any three (3) types of steel section used in building construction?
/3marks

ANSWER:

- | | |
|----------------------------|---------------|
| 1. Rolled Angle Sections | /1mark |
| 2. Rolled Channel Sections | /1mark |
| 3. Rolled T- Sections | /1mark |
| 4. Rolled I – Sections | |

Reference L.O. 2: Identify industrial building construction materials

Indicative content 2.2: Adequate building construction metal is described according to the use.

O14. Aggregates is granular materials, such as sand, gravel, crushed stones .where the aggregate is extracted from? **/ 3marks**

ANSWER:

Where the Aggregate is extracted from?

Rock Quarries:

Quarry is place which aggregates, rocks, sand and mineral are extracted by means of collection and excavation. The biggest source of obtaining aggregate is the rock quarries. Rock quarries are natural sites, enriched with all of the above mentioned materials.

Crushing Plant:

The crushing plants are the artificial method for obtaining the concrete gravels. The crushing plants crush and grind the large sized stones into boulder, gravel of large and fine sizes, coarse and sand. Today, the crushing plants are meeting 60 % aggregate demand for the construction all through the globe.

Sand and Gravel Quarries:

Natural streams in the hilly and mountainous areas are enriched with sand and gravel. Sand and gravel, being the fundamental constituents of civil construction are obtained from natural quarries.

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Marine Aggregate:

Marine aggregate is obtained from coasts of seas and continental shelves. Marine aggregates are the gravels and sand dredged from the sea bed. However, the aggregate may also be obtained from the land/continental land.

Reference L.O.1: Identify natural building construction materials.

Indicative Content 1.2. Appropriate building aggregates are described according to the standards.

Q15. Provide any three (3) demerits of using improper water for construction works.
/3marks

ANSWER:

Reduced Strength of Concrete **/1mark**

- Impurities in water, such as salts, acids, or organic matter, can interfere with the cement hydration process, leading to weaker concrete and reducing the overall structural strength.

2. Corrosion of Reinforcement **/1mark**

- Water containing chlorides or sulfates can cause corrosion of steel reinforcement, leading to cracks and a reduced lifespan of reinforced concrete structures.

3. Poor Workability and Setting Time **/1mark**

- Contaminated water can alter the setting time of cement, either making it set too quickly (leading to poor bonding) or too slowly (causing construction delays and weak structures).

Reference L.O.1: Identify natural building construction materials.

Indicative content 1.3. Adequate water for construction works is described according to the standards.

Q16. Burning of bricks this is very important operation in the manufacturing of bricks to impart hardness, strength and makes them dense and durable. Where burning of bricks is done? /1marks

ANSWE:

Burning of bricks is done in kilns or clamps. /1mark

Reference: L.O.3. : Identify pre-fabricated building construction materials
Indicative content 3.1: Adequate soil-based building construction products are described according to the standards.

Q17. List any two (2) types of continuous kilns. /2marks

ANSWER:

Bull's trench kiln	/1mark
Hoffman's kiln	/1mark

Reference: L.O.3. : Identify pre-fabricated building construction materials
Indicative content 3.1: Adequate soil-based building construction products are described according to the standards.

SECTION B: Attempt any three (3) questions**/30marks**

Q18. Mr. MUHIRE want to construct the building by using Portland cement as leaners who learning well the tests of cement. As advanced operator, after defining term cement, help him to compare test of cement for field and laboratory. / **10marks**

ANSWER

Definition of cement: Cement is widely used in construction for making concrete, mortar, and stucco, providing strength, durability, and structural integrity to buildings and infrastructure.

Field-tests of cement**/4.5marks**

- i) Colour of Cement Should be Greenish Grey.
- ii) Should not contain any visible lumps.
- iii) Should have homogeneous colour and texture.
- iv) Should give Cool feeling when hand is thrust inside the bag of cement.
- V) Should give smooth feeling not gritty when rubbed between the fingers.
- vi) When a handful of cement is thrown in a bucket full of water it should float on the surface of water before sinking.

While for Laboratory tests for cement**/4.5marks**

- i) Fineness test of cement
- ii) Standard Consistency test of cement
- iii) Initial Setting time-
 - When the paste will start losing its plasticity, the needle will penetrate only to some depth.
 - The period elapsing between the time when water is added to the cement and to the time at which the needle penetrates the test block to a depth equal to 33-35mm from the top is taken as initial time.
 - For OPC it is generally taken as 30min.
- iv) Final Setting time-
 - The cement is considered fully set when the centre needle makes an impression while the annular attachment fails to do so.
 - The cement is said to be hard if it does not pierce more than 0.5mm.

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- It is generally taken as 10 hrs.

v) Soundness test

- The Cement is said to be unsound if it has excess of lime.
- Due to high proportions of magnesium content or Calcium sulphate content.
- Because of inadequate burning of cement.
- Due to insufficiency in fineness of grinding or thorough mixing of raw materials.
- It cause appreciable change in the volume of cement after the cement has set causing disruption of the set and hardened mass.
- Le-Chatlier's Apparatus is used for the test.

- In case the expansion is more than 10mm than the cement is said to be unsound Compressive Strength test of cement

- It is Laboratory method to determine the strength of cement.
- The size of cube mould is 70.6mm.
- Cement and standard sand mortar is used to make the cube.

- Three cubes are tested for the strength

Reference L.O. 2: Identify industrial building construction materials

Indicative content 2. 1: Proper building construction cement is described according to the standards.

Q19. A cement is a binder, a substance used for construction that sets, hardens, and adheres to other materials to bind them together. Cement is seldom used on its own, but rather to bind sand and gravel together. Cement mixed with fine aggregate produces mortar for masonry, or with sand and gravel, produces concrete. As masonry supervisor, you are asked to mention all steps of cement manufacturing. /10marks

ANSWER

1. Mining and Extraction of Raw Materials /2 Marks

- The raw materials for cement production are mainly limestone, clay, gypsum, and sand.
- These materials are extracted from quarries and mines using heavy machinery like excavators and drills.
- Limestone is the main ingredient, while clay provides silica, alumina, and iron, essential for proper chemical composition.

2. Crushing and Grinding /1 Mark

- After extraction, the raw materials are crushed into smaller pieces to increase surface area for the next steps.
- The materials are then ground into a fine powder in ball mills or vertical roller mills to prepare them for mixing.

3. Proportioning and Blending / 1 mark

The crushed materials are mixed in specific proportions to achieve the correct chemical composition for the cement.

This process ensures the right balance of calcium, silica, alumina, and iron oxide is achieved.

Blending is done using machines like blenders or mixers to ensure a uniform mixture.

4. Heating in a Rotary Kiln /2 marks

- The blended raw materials are fed into a rotary kiln, where they are heated to temperatures of about 1450°C.
- In the kiln, a series of chemical reactions occur:
 - Calcium carbonate (CaCO_3) decomposes into lime (CaO) and carbon dioxide (CO_2).
 - The lime reacts with silica, alumina, and iron to form the clinker, which is the primary component of cement.
- The rotary kiln is a large cylindrical furnace that rotates, ensuring even heating and consistent chemical reactions.

5. Cooling of Clinker

/1 mark

- After the clinker is formed, it is rapidly cooled in a cooling chamber to avoid crystallization of certain minerals.
- The cooling process also helps in the formation of belite and other minerals that contribute to the strength and properties of the cement.

6. Grinding of Clinker and Addition of Gypsum

/2 marks

- The cooled clinker is then ground into a fine powder in ball mills or vertical mills.
- Gypsum is added to control the setting time of the cement, preventing it from setting too quickly.
- The grinding process helps to achieve the desired fineness of the cement, which is crucial for its performance.

7. Storage and Packaging

/1 Mark

- The final product, cement, is stored in large silos to prevent moisture absorption.
- It is then packaged into bags or transported in bulk for delivery to construction sites.

Reference L.O. 2: Identify industrial building construction materials , Indicative content 2. 1: Proper building construction cement is described according to the standards.

Q20. Explain clearly sun dried bricks from burnt bricks as broadly categories of bricks. /10marks

ANSWER:

- i) **Un burnt or Sun dried bricks:** Un burn or sun dried with the help of heat received from sun after the process of moulding. These bricks can only be used in the constructions of temporary and cheap structures. Such bricks should not be used at places exposed to heavy rains.
/4marks

While for:

- ii) **Burnt Bricks:** The bricks used in construction works are burnt bricks and they are classified into the following four categories. **/2mark**

- a. **First Class bricks:** These bricks are table moulded and of standard shape. The surface and edges of the bricks are sharp, square, smooth and straight. The comply

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all the qualities of good bricks and used for superior work of permanent nature.

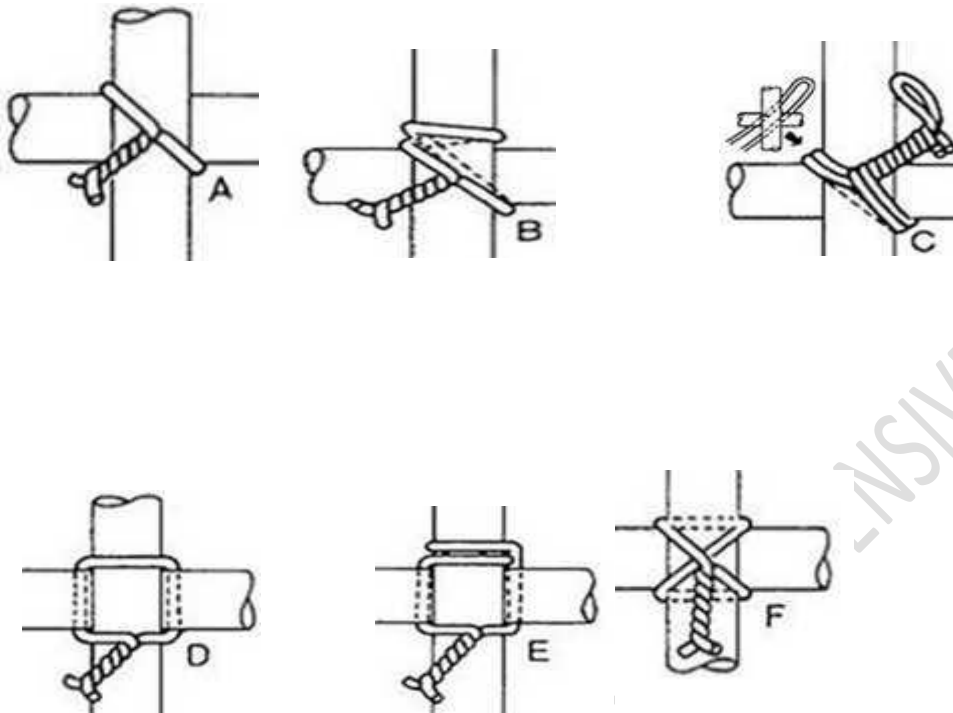
/1mark

- b. **Second class bricks:** These bricks are ground moulded and they are burnt in kilns. The surface of bricks is somewhat rough and shape is slightly irregular. These bricks are commonly used at places where brickwork is to be provided with a coat of plaster. **/1mark**
- c. **Third class bricks:** These bricks are ground moulded and they burnt in clamps. These bricks are not hard and they have rough surfaces with irregular and distorted edges. **/1mark**
- These bricks give dull sound when struck together. They are used for unimportant and temporary structures and at places where rainfall is not heavy.
- d. **Fourth-class bricks:** These are over burnt bricks with irregular shape and dark colour. These bricks are used as aggregate for concrete in foundation, floors, roads, etc because of the fact that the over burnt bricks have compacted structure and hence, they are sometimes found stronger than even first class bricks. **/1mark**

Reference: L.O.3. : Identify pre-fabricated building construction materials

Indicative content 3.1: Adequate soil-based building construction products are described according to the standards.

Q21. I. Name different ways of tying binding wires according to the figures below. /6marks



II. State any four (4) types of steel reinforcement used in building construction. /4marks

ANSWER:

I.A= Simple Tie - Light floor mats /1mark

B= Wall Tie -Vertical mats /1mark

C= Double-Strand Single Tie - Heavy works /1mark

D= Saddle /1mark

E= Tie with Twist - Heavy mats to be lifted by crane /1mark

F= Cross Tie - For no twist in bars /1mark

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II. Hot Rolled Deformed Bars /1mark

Cold Worked Steel Bars /1mark

Mild Steel Plain Bars /1mark

Prestressing Steel Bars /1mark

Reference L.O. 2: Identify industrial building construction materials

Indicative content 2.2: Adequate building construction metal is described according to the use.

Q22. Distinguish between the defects in cement-based products and defects of bricks/blocks. /10marks

ANSWER:

- Defects of bricks/ blocks**

Over burning /2mark

When the bricks are over burnt, a soft molten mass is produced. The brick loses its shape. Over burnt bricks are unsuitable for construction works

Under burning

If the bricks are under burnt, the clay is not softened due to insufficient heat. Also the pores remain unclosed. Under burning of brick increases water absorption and decreases compressive strength. Under burnt bricks are also not suitable for construction works.

Bloating 1/mark

It is the phenomenon by which spongy swollen mass over the surface of the brick is called bloating. Bloating of bricks occur due to the presence of excess carbon and sulphur in brick earth.

Black core

The bitumen or carbon if present in brick earth will not be completely oxidized. Due to improper burning of bricks, formation of black core occurs.

Efflorescence /1mark

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Efflorescence in bricks due to the presence of alkali (soluble salts). The bricks on contact with moisture, water gets absorbed and alkali crystallizes. On drying grey or white patches form on the surface of the brick. Efflorescence in bricks is minimized by

- Selecting proper clay,
- Preventing moisture to come in contact with brick,
- Providing waterproofing coating,.

Spalling /1mark

The phenomenon by which surface of brick flakes off is called as Spalling of brick. It is due to the heating of water inside the brick. and

❖ Defects in cement based products

Honeycomb and Rock Pockets	/1mark
Defects due to Poor Formwork Installation	/1mark
Defects due to Concrete Dimensional Errors	/1mark
Defects due to Finishing Errors	/1mark
Shrinkage Cracks	/1mark

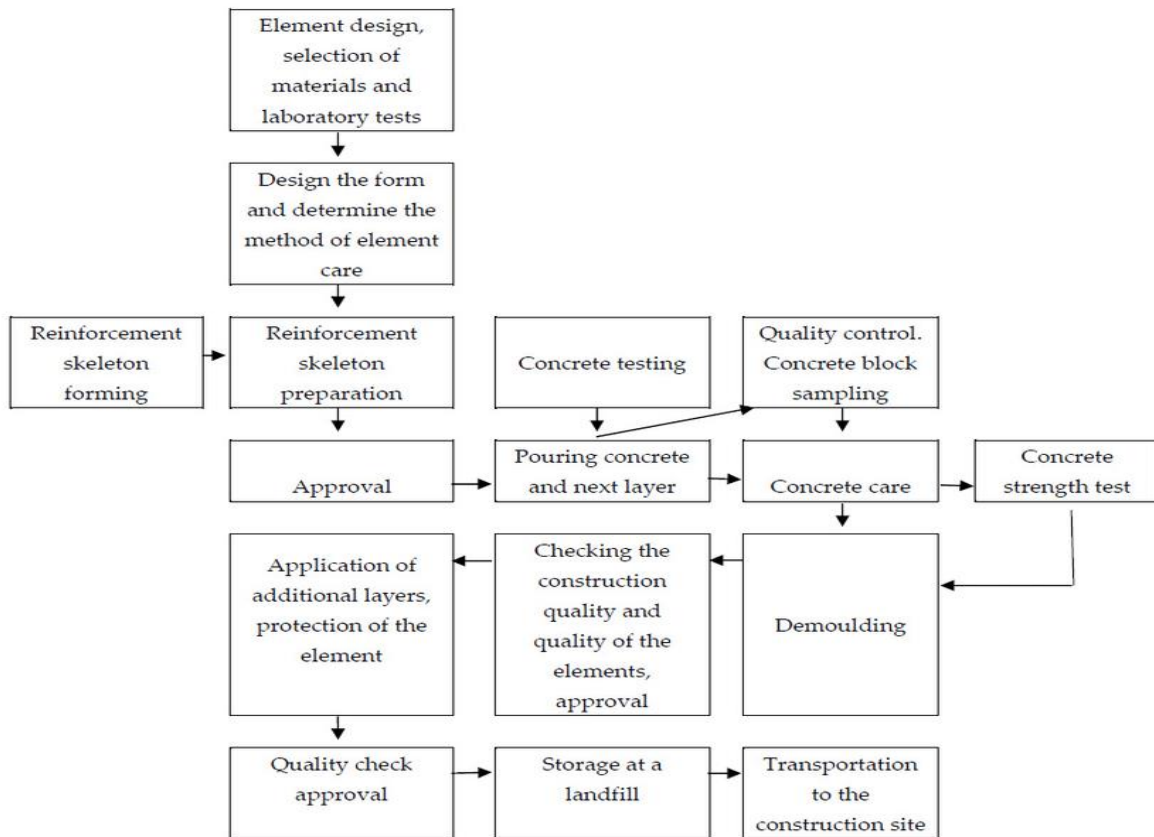
SECTION C: Attempt only one (1) question 15marks

Q23. Arrange the followings manufacturing process of pre-fabricated buildings structure elements to construct flow chart. /15marks

- ✓ Storage at a land fill
- ✓ Quality check approval
- ✓ Demoulding
- ✓ Element design , selection of materials and laboratory tests
- ✓ Reinforcement skeleton forming
- ✓ Quality control concrete blocks sampling
- ✓ Reinforcement skeleton preparation
- ✓ Design the form and determine the method of element care
- ✓ Concrete testing
- ✓ Concrete strength test
- ✓ Transportation to the construction site
- ✓ Approval
- ✓ Pouring concrete and next layer
- ✓ Checking the construction quality and quality of the elements , approval
- ✓ Application of additional layers protection of the element
- ✓ Concrete care

ANSWER:

Pre-fabricated buildings structure elements to construct flow chart. /15marks



Reference: L.O.3. : Identify pre-fabricated building construction materials
Indicative content 3.2: Convenient building construction cement based products are described according to the Standards .

Q24. I. Explain clearly the following two (2) types of pavers and their manufacturing process: /10marks

- Marble pavers
- Plastic pavers

II. Discuss about any five (5) qualities of cement based products complying with Rwandan standards. /5marks

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ANSWER:

a. Marble Pavers /5marks

Marble pavers are natural stone pavers made from marble, a metamorphic rock formed from limestone under heat and pressure. These pavers are known for their luxurious appearance, durability, and resistance to extreme weather conditions. They are commonly used for outdoor flooring, patios, walkways, and pool decks due to their aesthetic appeal and long lifespan.

Manufacturing Process:

1. **Quarrying:** Large marble blocks are extracted from quarries using wire saws, diamond-tipped blades, or explosives.
2. **Cutting:** The marble blocks are cut into slabs or smaller pieces using gang saws or bridge saws.
3. **Shaping and Finishing:** The marble is shaped into paver sizes, and surfaces may be polished, tumbled, or brushed to achieve different textures.
4. **Quality Control:** The pavers are inspected for cracks, color variations, and defects.
5. **Packaging and Distribution:** The finished marble pavers are packed and shipped to suppliers or construction sites.

b. Plastic Pavers: /5marks

Plastic pavers are eco-friendly paving blocks made from recycled plastic materials, such as polyethylene (PE), polypropylene (PP), and polyethylene terephthalate (PET). These pavers are lightweight, durable, and resistant to chemicals, making them suitable for driveways, footpaths, and garden areas.

Manufacturing Process:

1. **Collection of Plastic Waste:** Used plastic materials are collected from recycling plants and waste sources.
2. **Sorting and Cleaning:** The plastics are sorted based on type and cleaned to remove dirt and impurities.
3. **Shredding:** The plastic is shredded into small granules for easier processing.
4. **Melting and Mixing:** The shredded plastic is melted and mixed with additives like sand or other binding agents to enhance strength.
5. **Molding and Cooling:** The molten mixture is poured into molds of different shapes and sizes, and then cooled to solidify.
6. **Quality Testing:** The pavers undergo strength, durability, and weight tests.
7. **Packaging and Distribution:** The finished plastic pavers are packed and delivered for construction use.

II. • **Compressive Strength** – Cement-based products must have adequate strength to withstand applied loads without failure. Rwandan standards specify minimum strength requirements depending on the type of product (e.g., concrete blocks, tiles, or pavements). **/1mark**

Durability – These products should resist environmental factors such as moisture, temperature changes, and chemical attacks, ensuring a long service life. **/1mark**

Water Absorption – Cement products should have low water absorption to prevent weakening and degradation over time, especially in areas with high humidity or heavy rainfall. **/1mark**

Dimensional Accuracy – Products like concrete blocks and tiles must have precise dimensions and shapes to ensure uniformity, proper fitting, and ease of construction. **/1mark**

Setting Time – The cement used must comply with standard setting times, ensuring it hardens within a suitable period for construction efficiency while allowing adequate time for placement and finishing. **1/mark**

Reference: L.O.3. : Identify pre-fabricated building construction materials

Indicative content 3.2: Convenient building construction cement based products are described according to the standards .

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SCHOOL YEAR: 2024-2025 MARKING GUIDES