

CPCCBC4006B

SELECT, PROCURE AND STORE CONSTRUCTION MATERIALS FOR LOW RISE PROJECTS

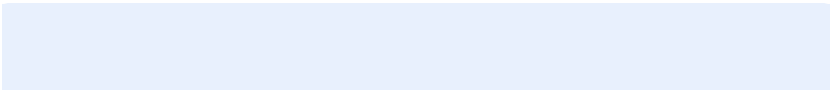
THEORY EXAM INSTRUCTIONS

- This exam will occur under standard assessment conditions.
 - An oral examination may be allowed under certain circumstances. Answers will be documented and FT003 (Oral examination declaration form) must be completed.
- Participants must provide enough detail in their responses to demonstrate their knowledge and skills.
- Please fill in the details below, providing your name, signature and date of assessment.
 - Your signature acknowledges that this is your own work.
- If a participant initially answers a question incorrectly but modifies their response, they must follow the instructions below:
 - If a participant changes their response in writing, they must put their initials next to the written change.
 - If a participant changes their response verbally, this must be noted on the exam paper by the assessor.

Participant name Courtney Stallard

Participant signature 

Assessor name _____

Assessor signature 

Date 23/09/2019

Number of questions	Number of questions answered correctly	Satisfactory?	
		Yes	No
44		☐	☐

ASSESSOR COMMENTS

Q1. Which of the following documents and/or people would you refer to when selecting materials for a building project? Tick all that apply.

Answer	Choice	Possible Answers	☐
	☒	Australian Standards	
	☒	Contract	
	☒	Drawings	
	☒	Manufacturer	
	☒	National Construction Code	
	☒	Specifications	
	☒	Tolerances	

Q2. Identify the Volume and Parts of the NCC that relate to suitability of materials for Classes 1 and 10, and Classes 2 to 9.

Answer	Classes 1 and 10	Classes 2 to 9	☐
	<u>NCC 2016 Volume Two Section 1 General Requirements Part 1.2 Acceptance of Design and Construction</u> 1.2.1 Suitability of materials	<u>NCC 2016 Volume One Amendment 1 Section A General Requirements Part A2 Acceptance of Design and Construction</u> A2.1 Suitability of materials	

Q3. Identify the assessment methods used to verify a performance solution.

Answer	• Evidence of suitability • A verification method • Expert judgement • Comparison with the Deemed-to-Satisfy provisions	☐
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Q4. Which of the following solutions for material selection often references the Australian Standards? Tick your response.

Answer	Choice	Possible Answers	☐
	☒	Deemed-to-Satisfy solution	

☐	Performance solution
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Q5. Identify five (5) materials commonly used for *low rise buildings* in your region. For each material, identify the following:

- Its name
- Properties of the material

Answer

#	Material name	Properties
1	Wood	Wood is a product of trees, and sometimes other fibrous plants, used for construction purposes when cut or pressed into lumber and timber, such as boards, planks and similar materials. It is a generic building material and is used in building because: • different structures can be built in most climates • very flexible under loads, keeping strength while bending • incredibly strong when compressed vertically • There are many types so specific species are better for various uses than others
2	Brick and Block	A brick is a block made of kiln-fired material, usually clay or shale, but also may be of lower quality mud, etc. Clay bricks are formed in a moulding (soft mud method), or in commercial manufacture by extruding clay through a die and wire-cutting them to the proper size (the stiff mud process). Bricks were widely used as a building material in the 1700, 1800 and 1900s. This was probably due to the fact that it was much more flame retardant than wood in the ever crowding cities, and fairly cheap to produce. Another type of block replaced clay bricks in the late 20th century. It was the Cinder block and made mostly with concrete.
3	Concrete	Concrete is a composite building material made from the combination of aggregate (composite) and a binder, ie. Cement and it has been the predominant building material in modern age due to its longevity, formability, and ease of transport. The most common form of concrete is Portland cement concrete, which consists of mineral aggregate (gravel and sand) and when mixed hydrates and eventually hardens into a stone-



		like material: this is the material referred to as concrete. Concrete has a rather low tensile strength, it is generally strengthened using steel rods or bars (known as rebars), referred to as reinforced concrete. A vibrator is used to eliminate any air that has been entrained when the liquid concrete mix is poured around the ironwork.
4	Metal	Metal is used as structural framework for larger buildings such as skyscrapers, or as an external surface covering. There are many types used for building, such as: • Steel - a metal alloy whose major component is iron which is strong, flexible, and if refined well and/or treated lasts a long time • Aluminium alloys and tin are lower density/corrosive resistant • Brass was common but is usually restricted to specific uses today • Other metals used include titanium, chrome, gold and silver. • Chrome, gold, and silver are used as decoration Metal figures quite prominently in prefabricated structures used in most cosmopolitan cities. It requires a great deal of human labour to produce metal, especially in large amounts needed for the building industries.
5	Glass	Clear windows have been used since the invention of glass to cover small openings in a building. They provided people with the ability to both let light into rooms while keeping inclement weather outside. Glass is generally made from mixtures of sand and silicates, and is very brittle. Modern glass “curtain walls” can be used to cover the entire facade of a building. Glass can also be used to span over a wide roof structure in a “space frame”.

- Q6. For each of the materials in Q5. identify the following:
- Quality of the material (i.e. durability, serviceability, cost effectiveness)
 - Compatibility and non-compatibility of the material (i.e. what it would/would not be suitable for)

Answer

#	Quality	Compatibility
1	Good Durability Easy Serviceability Cost Effective	Frames & Trusses Windows & Doors Skirthing & Architraves
2	Good Durability Easy Serviceability Cost Effective	External Walls
3	Good Durability	Foundation Slab Driveway & Paths
4	Good Durability Easy Serviceability	Windows & Doors Ceiling Beams Sinks & Tapware
5	Easy Serviceability Cost Effective	Windows & Doors Mirrors



Q7. Identify five (5) physical characteristics that may be considered when evaluating potential building materials.

Answer

Durability
Density
Ease of keeping clean
Porous/Non Porous
Insulation Properties
Non Slip Properties
Non-Combustable

☐

Q8. Match the terms and definitions below by writing the appropriate letter next to each number in the centre column.

Answer

Term		Answers	Definition	
1	Carbon footprint	1 - B	A	The amount of energy required to manufacture a product
2	CO ₂ e	2 - E	B	Total GHD emissions produced during manufacture construction and use
3	Embodied energy	3 - A	C	Greenhouse gas emissions
4	Embodied water	4 - D	D	The amount of water required to manufacture a product
5	GHG	5 - C	E	CO ₂ equivalent tonnes emitted into the atmosphere

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Q9. Which of the following materials would be considered as 'low energy content'? Tick all that apply.

Answer

Choice	Possible Answers
☐	Bricks
☒	By-products of other industrial processes
☐	Cement
☐	Glass
☐	Metals
☐	Plastics
☒	Sand
☒	Stone
☒	Timber

☐

Q10. Refer to the table below and identify the wall material type that has the smallest embodied energy and emission impact.

COMPONENT	kWh/ m2 indoor floor area	Kg CO2e/ m2 indoor floor area
Floor suspended slab 114 - 117 mm	208	68
Floor suspended timber on stumps	76	26
ROOF		
Roof steel frame colorbond steel or tile	209	72
Roof timber frame colorbond steel or tile	143	47
WALLS		
Walls double brick; s/b interior	312	103
Walls brick veneer timber frame	204	67
Walls timber frame fibro clad	61	20
Walls steel frame fibro clad	90	30
Walls Timber frame timber clad	68	23
Walls pre-cast concrete	264	88
Walls concrete block	160	53
OTHER , APPLICABLE TO ALL HOMES REGARDLESS OF TYPE		
Construction, admin, transport, other materials such as copper pipes, glass, aluminium	406	144
Floor coverings assume approx. 50% ceramic tile 50% polypropylene carpet	61	20
Fittings, fixed appliances built in \$ bathroom, kitchen, w/robes	96	43
ADDITIONS	kWh/ m2 area or m length	Kg CO2e/ m2 area or m length
Roofed open areas - alfresco / porch / verandah / carport	352	117
Garage single brick or cavity walls, concrete slab, steel or tile roof	675	219
Open Carport	352	117
Fence brick or metal (per metre length, assuming 1.5 m height)	186	61
Paving (brick or concrete)	96	32
Pool (concrete below ground)	534	198

Answer Timber Frame Fibro Clad



Q11. Identify the Volume and Parts of the NCC that relate to energy efficiency of materials for Classes 1 and 10, and Classes 2 to 9.

Answer

Classes 1 and 10	Classes 2 to 9
<u>NCC 2019 Volume One Queensland Section J Energy efficiency</u>	<u>NCC 2019 Volume One Queensland Section J Energy efficiency</u>

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Q12. Identify the relevant section of the Standards and Tolerances Guide and the associated Australian Standard that addresses residential slabs and footings.

Answer

Standards and Tolerances Guide	Australian Standard
3.2 Footings and slabs generally	AS 2870 – Residential Slabs and Footings.

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Q13. Identify the relevant section of the Standards and Tolerances Guide and the associated Australian Standard that addresses roof tiles.

Answer

Standards and Tolerances Guide	Australian Standard
7.4 Roof Tiles	AS 2049 – Roof Tiles and AS 2050 – Installation of Roof Tiles

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Q14. Identify the Volume and Parts of the NCC that relate to safety barriers for swimming pools for Classes 1 and 10, and Classes 2 to 9.

Answer

Classes 1 and 10	Classes 2 to 9
<u>NCC 2019 Volume Two Part 3.10 Ancillary Provisions and Additional Construction Requirements Part 3.10.1 Swimming pools</u>	<u>NCC 2019 Volume Two Part 3.10 Ancillary Provisions and Additional Construction Requirements Part 3.10.1 Swimming pools</u>

☐

Q15. In some states, barriers and fences for swimming pools are not entirely regulated by the NCC, as noted in the Ancillary Provisions and State and Territory Variations. Identify the applicable Act and Regulation that regulate safety barriers for swimming pools in your jurisdiction.

Answer 2. [Part 3.9.3.0\(a\)](#) does not apply in Queensland.

Note: Restriction of access to *swimming pools* in Queensland is regulated under the Building Act 1975.

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Q16. Identify the Australian Standard that relates to safety barriers for swimming pools.

Answer Australian Standard AS1926.1 - Safety Barriers for Swimming Pools.

☐

Q17. True or False (Tick your response): According to the Standard in Q16. all gates must be fitted with a self-closing device that will return the gate to a closed position from any position without the use of manual force.

Answer

☒	True
☐	False

☐

Q18. Identify the Volume and Parts of the NCC that relate to fire-resistance of building elements for Classes 1 and 10, and Classes 2 to 9.

Answer

Classes 1 and 10	Classes 2 to 9
NCC 2019 Volume Two Schedule 5 Fire-resistance of Building Elements Schedule 5 Fire-resistance of building elements	NCC 2016 Volume One Amendment 1 Section A General Requirements Specification A2.3 Fire-Resistance of Building Elements Specification A2.3 Fire-Resistance of Building Elements

☐

Q19. Identify the Australian Standard that relates to fire-resistance tests for elements of construction.

Answer AS 1530.4-2005

Methods for fire tests on building materials, components and structures - Fire-resistance test of elements of construction

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Q20. For all NCC Classes, where the ground or subfloor space is excessively damp or subject to frequent flooding, which durability class must the subfloor framing must be used where above ground?

Answer

The subfloor framing when used above the ground must be Class 1 or 2 durability timbers or Class H3 preservative treated timbers; and where used in the ground must be Class 1 or 2 durability timbers or H5 preservative treated timbers in accordance with the AS 1684 Residential timber framed construction series of Australian Standards.



Q21. Identify the Australian Standards that must be observed when meeting the requirements for Q20.

Answer AS 1684 Residential timber framed construction

☐

Q22. True or False (Tick your response): Where materials are not used as intended (or without considering NCC requirements), this can make a significant difference to the life or serviceability of the structure.

Answer

☒	True
☐	False

☐

Q23. Explain why durability and serviceability impact on the cost effectiveness of chosen materials.

Answer The selection of building materials greatly impacts the sustainability and 'life' of a project therefore you need to consider the short and long-term degradation of these materials.
By choosing building materials wisely, such as considering the **complete life cycle of the materials**, you can provide advice to clients as well as reduce the impact of the project on the environment.
Many materials deteriorate due to weathering, which may cause a consequent failure of the structure. Materials may deteriorate in the short term and long term:

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Q24. Provide an example of short term degradation of materials and describe its effects on a building on structure.

Answer

- Timber is often prone to short term degradation. When exposed to the weather it may suffer from weathering, causing splitting and crumbling or if it is unprotected and remains damp for long periods, it will rot. Some timbers are naturally resistant to rot, for example western red cedar. These timbers form a protective skin on the surface that keeps them relatively intact.

☐

Q25. Provide an example of long term degradation of materials and describe its effects on a building on structure.

Answer

- Metals corrode as they form a compound with the oxygen in the air.
 - Some, such as iron, corrode relatively quickly while others such as copper are very slow.
- Stone usually forms a surface skin when exposed to the atmosphere. This can act to protect the stone or in some cases it may cause failure. The failure is usually associated with acid rain, a result of sulphur dioxide pollution in the atmosphere.
 - Limestone is particularly vulnerable to this. Some of the softer rocks such as sandstone and limestone also erode with constant exposure to wind and water. This is further exacerbated in cold climates where frost can freeze water in cracks and eventually cause the rock to break.
- Timber can also be vulnerable to chemical attack, from liquids, fumes or pollution. Attack is normally rapid at higher temperatures and hardwoods tend to be more susceptible than softwoods. Most timbers are resistant to weak acids, but susceptible to strong acids. Exposure to steam, such as in high temperature steaming processes, can cause serious reduction in the strength of timber.



Q26. You have spoken to a supplier who has indicated that some of the client's desired materials are unavailable. When considering alternative building materials what must be taken into consideration (i.e. other than the client's requirements)?

Answer

• Availability	• Environmental impact	☐
• Transportation	• Embedded energy	
• Handling	• Fire resistance rating	
• Testing	• Compatibility	
• Waste reduction	• Acoustic properties	
• Reuse/recycling	• Life-cycle cost	
• Renewable non-renewable	• Short and long-term degradation	

Q27. Identify two (2) things that you should look for when receiving a delivery of materials.

Answer

1. Before the delivery person leaves and before you sign anything:
 - Confirm the correct quantity
 - Confirm the condition of the delivery
2. The contents must be in perfect condition. Perfect means no damages at all. If, however, the box is damaged but the contents are still in tact, then this is not considered damage by the shipping company.

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Q28. If you encounter issues with delivery, what two (2) options do you have?

Answer

Accept items with 'Conditions'
Reject the entire shipment

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**Q29. Which of the following should be assessed before shifting materials?
Tick all that apply.**

Answer

Choice	Possible Answers
☒	What needs to be relocated (e.g. size, weight)
☒	The relocation area, site layout and obstacles
☒	Distance and time to relocate load
☒	Whether a team is available and/or appropriate
☒	Whether PPE must be worn (e.g. for hazardous materials)

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Q30. What document should you refer to for guidance on how to handle and store hazardous chemicals?

Answer

- The use of a Safety Data Sheet will give the best advice on correct handling and if special PPE is required.

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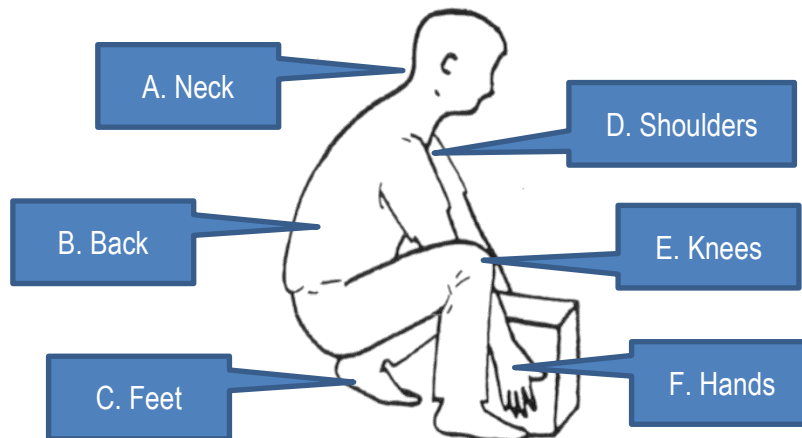
Q31. Name three (3) ways you can reduce the risk of injury if a load is too heavy for one person to carry, push or pull.

Answer

- Don't lift heavy objects by yourself, seek help, team lift, lighten the load, use a mechanical aid.
- Ensure the pathway is clear and no trip hazards are in the way.
- Do not twist when lifting objects, this is extremely risky.
- Take breaks from repetitious tasks.
- Ensure no jerky movements when lifting, carrying, pulling or pushing an object.



- Q32. In the diagram below a person is lifting a tool box.
Filling in the table, indicate how each body part should be used/placed.



Answer ☐

Area of body (Letter)	How it should be placed
D	Level
A	Upright
F	Good grip
B	Natural curve
E	Bent
C	Flat, facing load

- Q33. How should construction materials and components be handled?
Tick all that apply.

Answer ☐

Choice	Possible Answers
☒	Sorted to suit material type and size, separating hazardous material
☒	Stacked or stockpiled for ease of identification and retrieval
☒	Stored in access ways for ease of retrieval
☒	Stored clear of access ways
☒	Handled and positioned ready for installation

- Q34. Identify the Australian Standard that relates to the storage and handling of LP gas.

Answer

AS NZS 1596-2014 The storage and handling of LP Gas v2

Q35. List one (1) testing method for each of the building materials listed below.

Answer

Material name	Properties
Concrete	Concrete cylinders or cubes are normally tested in a hydraulic press. A universal machine for tension, compression and bending is also used.
Metals	- The strength of metals is reduced if they are repeatedly loaded alternately in tension and compression. This test is called 'repeated loading' if the load is applied several hundred or thousands of times, and fatigue loading if the load is applied millions of times. - Ductility is tested by bending a bar around a pin over a wide angle. - Hardness is tested by indentation with a diamond or a hardened steel ball. If the tensile strength has been tested, then the hardness of the metal can be deduced. - The toughness of a metal can also be deduced from the tension test. Toughness is defined as the energy required to break a material. The greater the area contained under a stress-strain curve up to failure, the greater the toughness of the material.
Timber	- When timber is used in domestic construction where it is not highly stressed, a visual grading may be a sufficient means of testing the material. - Because of imperfections in individual pieces, stress grading is usually more reliable than testing of selected pieces. - A stress grading machine tests every individual piece of timber using a very fast and economical method. The test is based on the relationship between the strength and the deflection of timber. Each piece of timber is deflected at several points along its length, and the



	deflection category marked by means of a spot of dye. The timber is then classified visually by its colour markings.
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Q36. What Code gives detailed tables which state the required grade of timber for specific sizes and uses?

Answer ☐

- The Australian Timber Framing Code gives detailed tables which state the required grade of timber for specific sizes and uses. The grading is performed at the timber mills or at the wholesaler's site.

Q37. Name two (2) ways that defects may be seen in timber.

Answer ☐

Fire
Termites
Weathering

Q38. Identify two (2) tests that may be performed to determine the durability of stone.

Answer ☐

- Acid immersion to test how quickly it dissolves under acidic conditions
- Wetting and drying
- Water absorption

Q39. Name two (2) ways that defects may be seen in stone.

Answer ☐

- Defects in stone are usually apparent as cracks and fissures in the rock surface. Visually, some may be ruled as unacceptable if they don't conform to the acceptable colour or grain size uniformity that is required for the job.

Q40. True or False (Tick your response): Under a contract, builders and other specialist tradespersons are the ones most likely to rectify or remedy

problems that arise from incorrect installation, application or placement of materials.

Answer

☒	True
☐	False

☐

Q41. Name two (2) established methods that may be used to preserve timber.

Answer

- Mechanical protection is useful in preventing the access of termites from the ground. Adult beetles lay their eggs in cracks in the surface of the wood, so a coat of paint will deter them. Similarly termite barriers of a variety of materials can also be used. These are often made from galvanised steel or aluminium.
- Soil poisoning may also be used by introducing a chemical barrier to prevent access from the ground to the building. Ideally the chemical should remain as a barrier in the soil indefinitely.
- Painting, adequate ventilation and detailing to prevent water remaining next to timbers are all useful in preventing fungal attacks.
- Preservative treatments can also be applied to deter either insects or fungi. This can be done by brushing or spraying, or by dip diffusion or pressure impregnation. Preservatives commonly used are tar-based oils such as creosote, organic compounds dissolved in solvents such as zinc naphthalene and water-based compounds such as copper-chrome-arsenate.

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Q42. Identify two (2) established methods that may be used to protect ferrous metals.

Answer

- This may include cathodic protection, corrosion inhibitors, controlling the environment or providing barriers to moisture / oxygen.
 - Painting metal can sometimes do all of these and is a common solution. A good paint system on steel will combine the use of rust inhibiting primers, moisture proof barriers and practicable maintenance features.
 - Other coatings such as galvanising provide even better protection. When metalwork is exposed or near more corrosive environments such as industrial areas or coastal areas special protection is typically required, such as can be achieved with epoxy paint systems or galvanising.

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Q43. Explain why the corrosion resistance of non-ferrous metals is superior to that of ordinary steel.

Answer

- The corrosion resistance of the non-ferrous metals used in building is greatly superior to that of ordinary steel. This is a result of the production of a ceramic coating of oxide or salt on the metal which protects it from further corrosion.

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**Q44. When should aluminium be coated with bituminous paint?
Tick all that apply.**

Answer

Choice	Possible Answers
☐	At all times
☒	When it is buried in soil
☒	When it comes in contact with chemical materials
☒	When it is immersed in water
☒	When it is used on bitumen

☐