



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF NATURAL RESOURCES AND SPATIAL SCIENCES**

**DEPARTMENT OF LAND AND PROPERTY SCIENCES**

<b>QUALIFICATION(S):</b> BACHELOR OF PROPERTY STUDIES DIPLOMA IN PROPERTY STUDIES	
<b>QUALIFICATION(S) CODE:</b> 08BPRS 06DPRS	<b>NQF LEVEL:</b> 5
<b>COURSE CODE:</b> BCS520S	<b>COURSE NAME:</b> BUILDING CONSTRUCTION AND SERVICES
<b>EXAMS SESSION:</b> NOVEMBER 2019	<b>PAPER:</b> THEORY
<b>DURATION:</b> 3 HOURS	<b>MARKS:</b> 100

<b>FIRST OPPORTUNITY EXAMINATION QUESTION PAPER</b>	
<b>EXAMINER(S)</b>	ELINA TEODOL
<b>MODERATOR:</b>	VERINJAERAKO KANGOTUE

<b>INSTRUCTIONS</b>	
<ol style="list-style-type: none"><li>1. Read the entire question paper before answering the Questions.</li><li>2. Please write clearly and legibly!</li><li>3. The question paper contains a total of <b>5 questions</b>.</li><li>4. You must answer <b><u>ALL QUESTIONS</u></b>.</li><li>5. Make sure your Student Number is on the EXAMINATION BOOK(S).</li></ol>	

**PERMISSIBLE MATERIALS**

1. Non-programmable Scientific Calculator

**THIS QUESTION PAPER CONSISTS OF 8 PAGES** (Including this front page)

**Question 1**

For each of the following statements indicate whether it is 'TRUE' OR 'FALSE'. Each correct answer carries 1 mark. (20)

- a) In construction works, burnt bricks can only be used in the construction of permanent and expensive structures.
- b) The major resources involved in the construction of buildings are materials to form the various parts/components and Technical ability to assemble the parts into an enclosure.
- c) Any foundation may fail as a result of subsidence due to mining underground and increase in the water table only.
- d) System building (Closed system Building) refers to a method of erecting a building based on the form of construction in which the component parts of the building fabric are partly factory produced.
- e) A damp-proof course (DPC) is an impermeable material built into the floor to prevent upward migration of groundwater.
- f) The performance requirements of any building include among others its appearance, sound control, dimensional suitability, weather exclusion, and fire protection.
- g) In floor construction, floor systems must transfer their loads horizontally across space to either beams or columns or to bearing walls.
- h) Building components will develop damages whenever the stress in the component exceeds its strength.
- i) Party wall refers to a wall separating two detached properties that are in separate ownership such as in terraced houses.
- j) Staircase is usually a recommended means of escape in a multi-storey building.

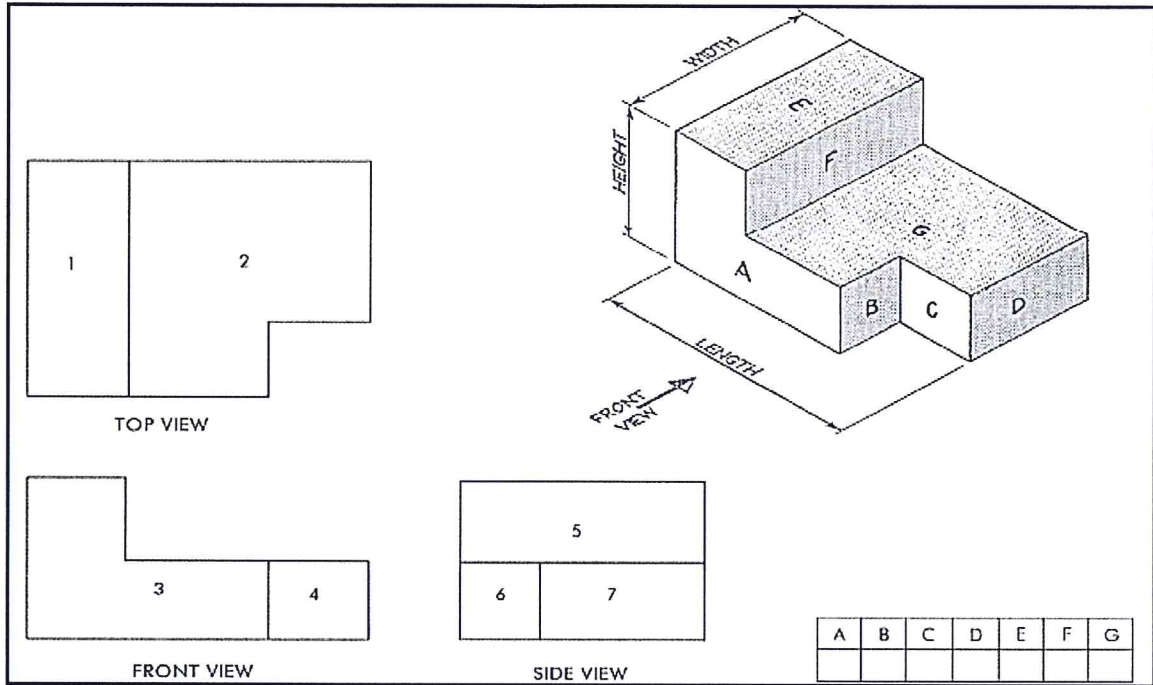
- k) In-situ wall finish materials are usually composed of binding materials and aggregates.
- l) In brick masonry, bricks laid with the shorter faces as seen in the elevation is generally known as Stretcher bonding.
- m) The hip roof is the type of roof which slopes in four directions and with all four sides meeting at the ridge.
- n) In applying finishing to walls, the render is applied inside while the plaster is done externally.
- o) Openings in walls are spanned by arches or lintels, or a combination of both.
- p) The durability of structures can be prolonged by proper maintenance practices, the use of quality materials for construction and good construction method.
- q) For thermal insulation purposes, the permitted area (size) of openings in perimeter walls for windows does not depend on whether the window is single, double or triple glazed.
- r) Reinforced brickwork refers to the process of incorporating aluminum wire or balustrades in walls to enhance resistance to loads.
- s) A continuous horizontal or vertical joint in brickwork filled with compressible material to accommodate movement due to moisture, thermal or structural effects is referred to as movement joint.
- t) The art of building structures using stones and binding materials like cement (mortar) is called stone masonry.

[20]

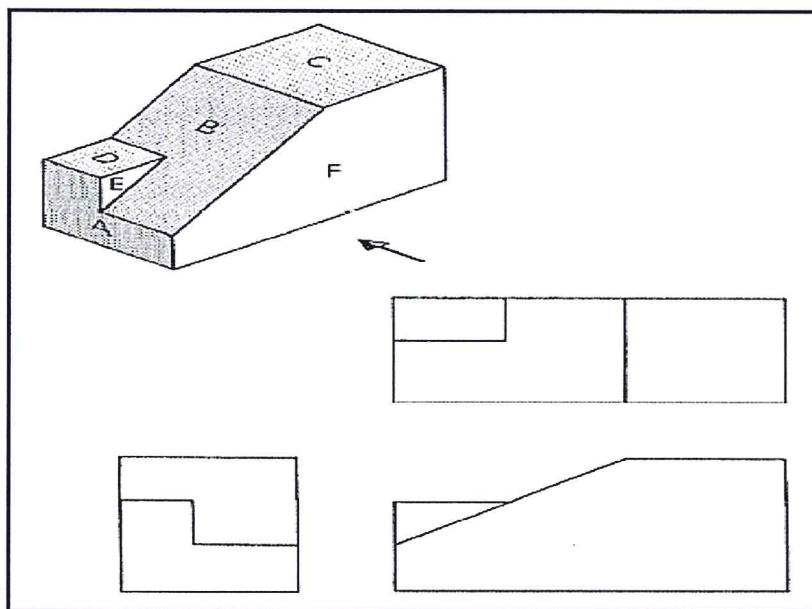
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**Question 2**

- a) Study the two drawings below and complete the table by matching the numbered surfaces of the orthogonal drawing with the lettered surfaces of the isometric drawing. The student must draw and complete the table in their exam book. (7)



- b) Transfer the letters from the isometric drawing onto the same plane surfaces of the orthogonal drawing. Name each view. (6)






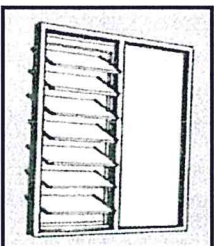

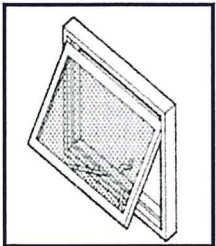
c) Study the terms listed below and complete the table by matching the building construction terminologies with the correct definition. (10)

	Terms		Definition
1	Concrete	A	A mixture of sand (lime), cement and water.
2	Arris	B	The end face of a standard brick.
3	Course	C	A low wall around the perimeter of a building at roof level or around balconies.
4	Datum	D	One complete level row of bricks in brickwork.
5	Header	E	The sharp edges of a brick.
6	Mortar	F	A mixture of sand, stone, cement and water that sets and hardens.
7	Parapet	G	The longer face of a brick showing in the surface of a wall.
8	Sill	H	The section of the floor at the doorway.
9	Stretcher	I	A fixed reference point from which levels are set out.
10	Threshold	J	The part of the brickwork directly below a window.

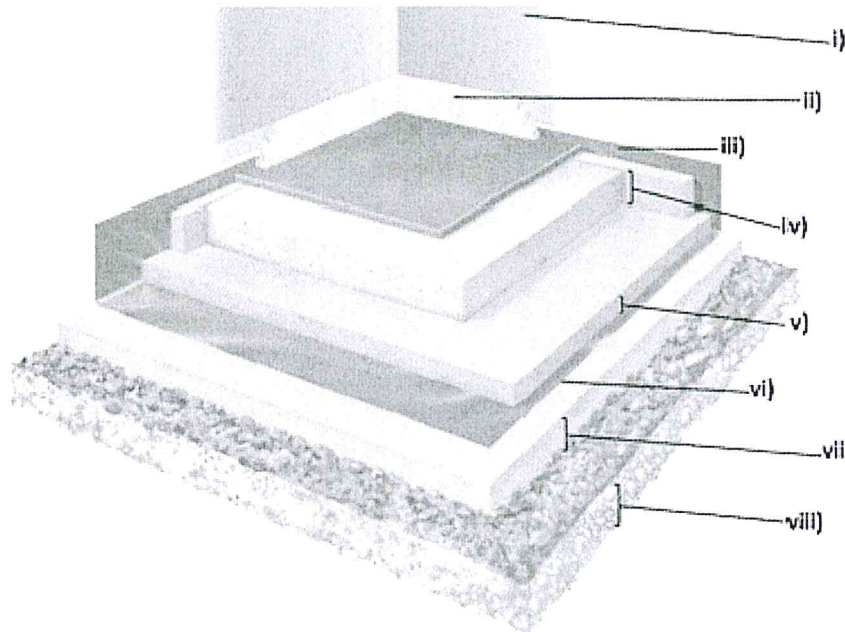
[23]

**Question 3**

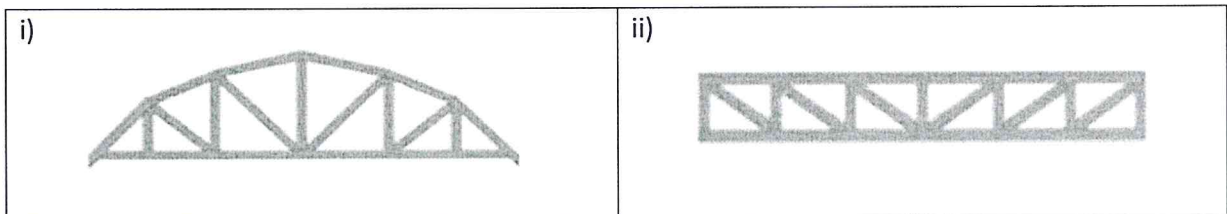
- a) Distinguish between the following terms as used in building construction: -
- i) Natural foundation and Artificial foundation (2)
  - ii) English bond and Flemish bond (2)
  - iii) Substructure and Superstructure (2)
- b) Identify each of the following basic types of Windows on the basis of the ways it can be opened. (4)

i)	ii)	iii)	iv)
			

c) Identify the components of a typical floor construction in buildings as indicated below. (4)



d) What are the four (4) main purposes for which hardcore is placed as the bottom-most layer in ground floor construction? (4)



e) Identify the following types of building roof trusses. (3)

f) State the four (4) requirements of any building foundation. (4)

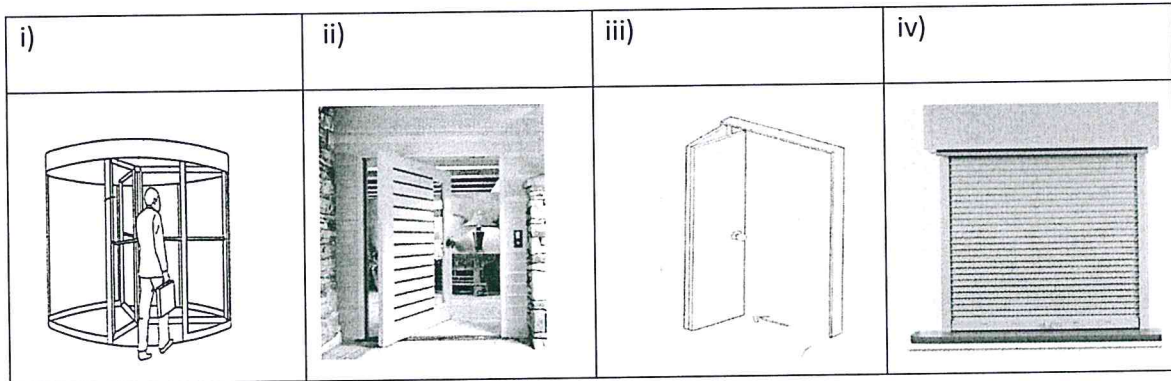
g) Outline the six (6) functions of the external walls of a building. (3)

h) In your own words define purpose made doors and give 3 examples of building in which they are usually found? (2)

**[30]**

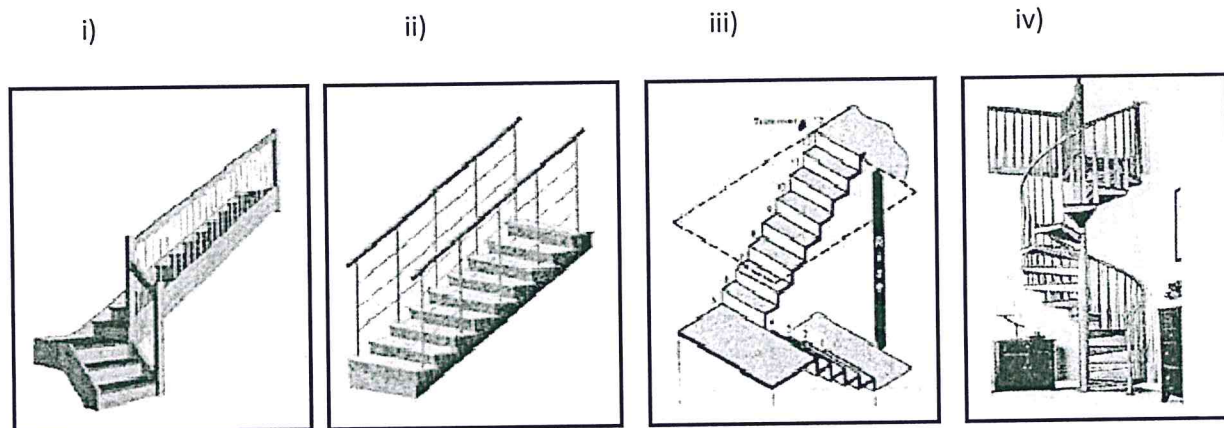
**Question 4**

a) Identify the following types of doors. (2)



b) Factors affecting the choice of materials for a roof structure include the type of roof required and the costs involved. Briefly explain these two factors. (3)

c) Identify each type of stair construction below and produce their respective sketch plan. (8)

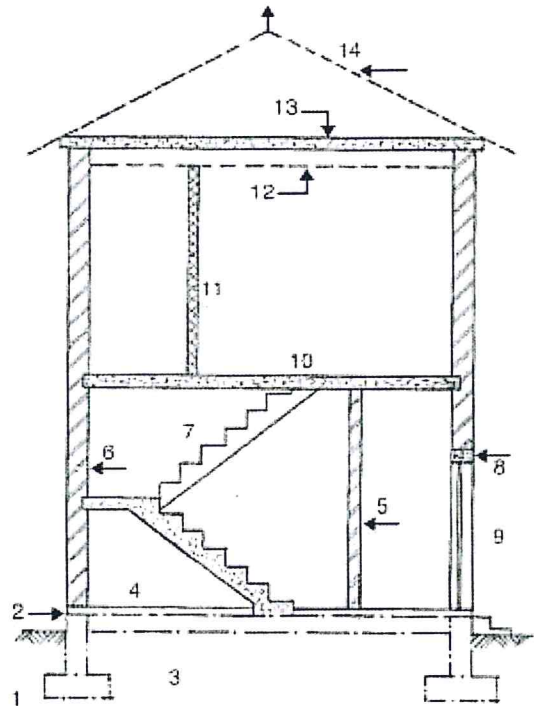


d) Distinguish between a Damp proof Course and Damp proof membrane (2)

[15]

**Question 5**

- a) Study the diagram below and identify the important parts of a building. (7)



- b) Produce an orthogonal drawing of the following types of building components and label them appropriately.

- i) A Flemish bond and English bond (2)
- ii) A Deep strip foundation and a Strip foundation. (2)
- iii) Symmetrical Lattice roof and Asymmetrical Lattice roof (1)

[12]

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**All the best of luck.**





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<b>FIRST OPPORTUNITY EXAMINATION MEMORANDUM</b>	
<b>EXAMINER(S)</b>	ELINA TEODOL
<b>MODERATOR:</b>	VERINJAERAKO KANGOTUE

**THIS MEMORANDUM CONSISTS OF 12 PAGES** (Including this front page)

- The model answers are used as guidelines only.
  - The information presented by the students will be evaluated on merit.
-

**Question 1**

For each of the following statements indicate whether it is 'TRUE' OR 'FALSE'. Each correct answer carries 1 mark. (20)

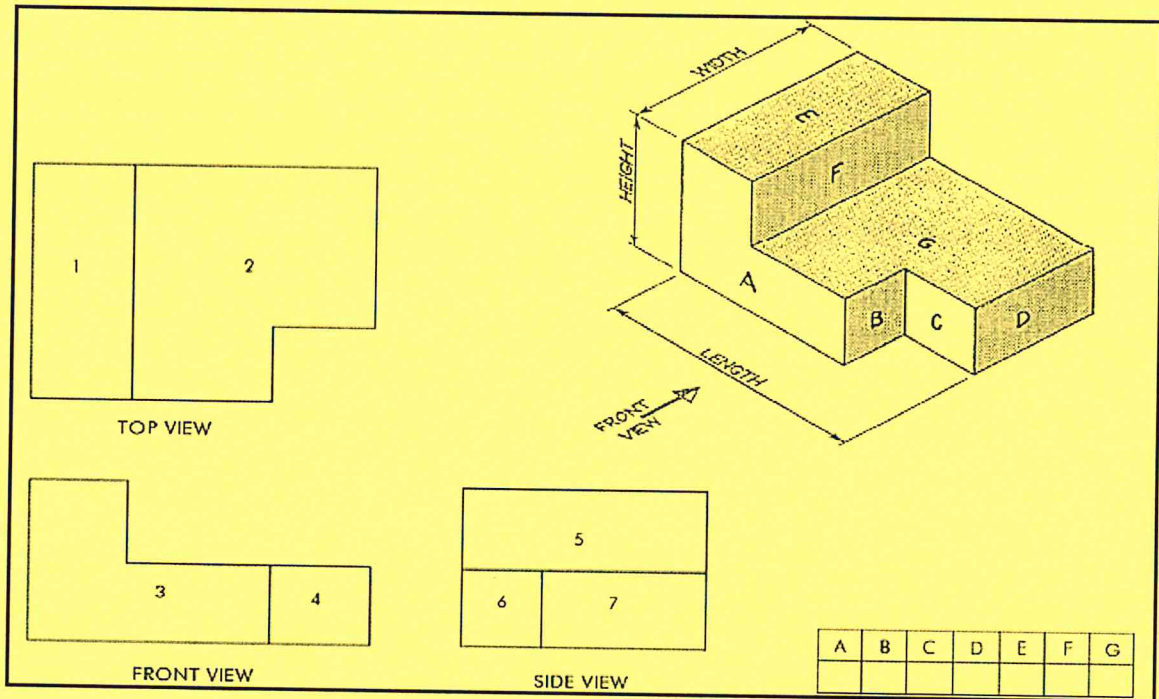
- a) In construction works, burnt bricks can only be used in the construction of permanent and expensive structures. *TRUE*
- b) The major resources involved in the construction of buildings are materials to form the various parts/components and Technical ability to assemble the parts into an enclosure. *TRUE*
- c) Any foundation may fail as a result of subsidence due to mining underground and increase in the water table only. *FALSE*
- d) System building (Closed system Building) refers to a method of erecting a building based on the form of construction in which the component parts of the building fabric are partly factory produced. *FALSE*
- e) A damp-proof course (DPC) is an impermeable material built into the floor to prevent upward migration of groundwater. *FALSE*
- f) The performance requirements of any building include among others its appearance, sound control, dimensional suitability, weather exclusion, and fire protection. *TRUE*
- g) In floor construction, floor systems must transfer their loads horizontally across space to either beams or columns or to bearing walls. *TRUE*
- h) Building components will develop damages whenever the stress in the component exceeds its strength. *TRUE*
- i) Party wall refers to a wall separating two detached properties that are in separate ownership such as in terraced houses. *FALSE*

- j) Staircase is usually a recommended means of escape in a multi-storey building. *TRUE*
- k) In-situ wall finish materials are usually composed of binding materials and aggregates. *TRUE*
- l) In brick masonry, bricks laid with the shorter faces as seen in the elevation is generally known as Stretcher bonding. *FALSE*
- m) The hip roof is the type of roof which slopes in four directions and with all four sides meeting at the ridge. *TRUE*
- n) In applying finishing to walls, the render is applied inside while the plaster is done externally. *FALSE*
- o) Openings in walls are spanned by arches or lintels, or a combination of both. *TRUE*
- p) The durability of structures can be prolonged by proper maintenance practices, the use of quality materials for construction and good construction method. *TRUE*
- q) For thermal insulation purposes, the permitted area (size) of openings in perimeter walls for windows does not depend on whether the window is single, double or triple glazed. *FALSE*
- r) Reinforced brickwork refers to the process of incorporating aluminum wire or balustrades in walls to enhance resistance to loads. *FALSE*
- s) A continuous horizontal or vertical joint in brickwork filled with compressible material to accommodate movement due to moisture, thermal or structural effects is referred to as movement joint. *TRUE*
- t) The art of building structures using stones and binding materials like cement (mortar) is called stone masonry. *TRUE*
- [20]**
-



**Question 2**

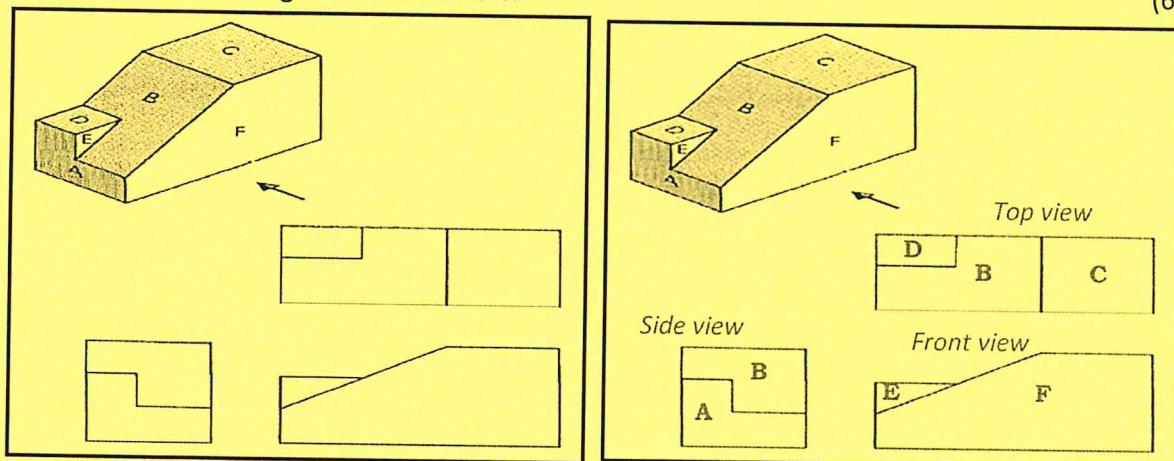
- a) Study the two drawings below and complete the table by matching the numbered surfaces of the orthogonal drawing with the lettered surfaces of the isometric drawing. The student must draw and complete the table in their exam book. (7)



A	B	C	D	E	F	G
3	6	4	7	1	5	2

*Note: One (1) mark for each correct answer*

- b) Transfer the letters from the isometric drawing onto the same plane surfaces of the orthogonal drawing. Name each view. (6)



*Note: Two (2) mark for each correct view*



- c) Study the terms listed below and complete the table by matching the building construction terminologies with the correct definition. (10)

	Terms		Definition
1	Concrete	A	A mixture of sand (lime), cement and water.
2	Arris	B	The end face of a standard brick.
3	Course	C	A low wall around the perimeter of a building at roof level or around balconies.
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10	Threshold	J	<i>The section of the floor at the doorway.</i>

Note: One (1) mark for each correct definition

[23]

**Question 3**

a) Distinguish between the following terms as used in building construction: -

i) Natural foundation and Artificial foundation (2)

*The Natural Foundation is that part of the subsoil on which the structure is in direct contact with the ground and its primary aim is to transmit and spread the loads (dead and live) from the building over a sufficient area of soil to avoid undue settlement because of the failure of the underlying soil.* (1)

*The Artificial Foundation is the part of the structure which transmits the load to the natural foundation and may be classified as traditional strip/deep foundation, pier foundation, raft foundation, pad foundation, etc.* (1)

ii) English bond and Flemish bond (2)

*English Bond consists of stretchers throughout the length of one course and headers throughout the next course. It is stronger than the Flemish bond and is particularly well suited for use in manhole and retaining walls.* (1)

*Flemish Bond is commonly used for solid brick walls as it combines an attractive appearance with reasonable strength. Here we have alternate Headers and Stretchers. It is more economical than English bond as less facing bricks required.* (1)

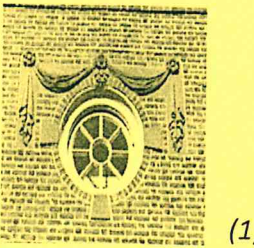
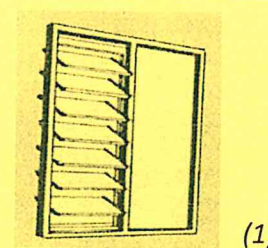
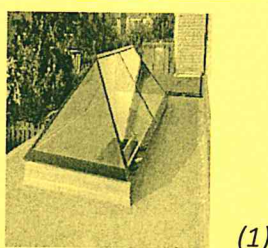
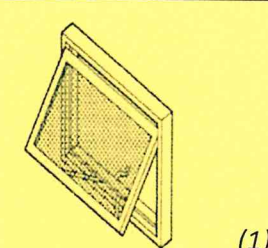
iii) Substructure and Superstructure (2)

*Substructure this comprises all parts of the structure or building up to and including any oversite concrete for floors. This includes all foundations and walls up to damp proof course level.* (1)

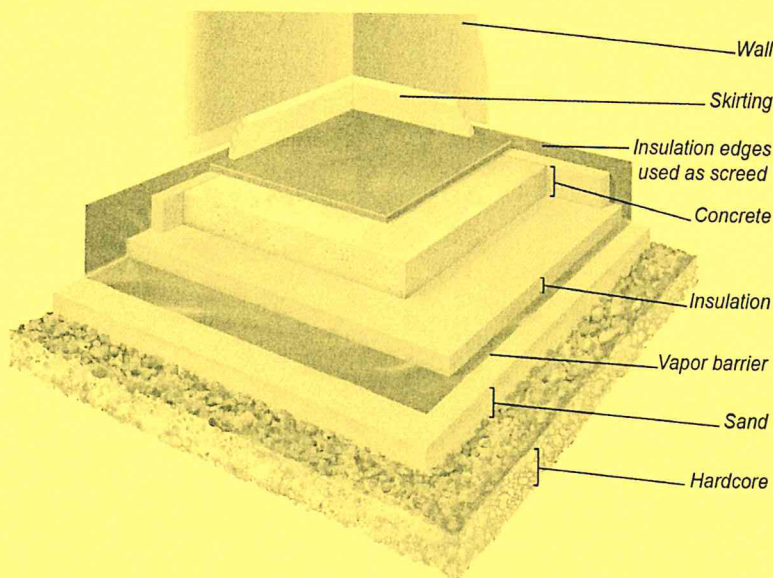
*Superstructure referred to as being the part above the substructure. It consists of the walls, roofs, and floors.* (1)



b) Identify each of the following basic types of Windows on the basis of the ways it can be opened. (4)

i) Bull's-eye window	ii) Louvre window	iii) Lantern Window	iv) Awning
 <p>(1)</p>	 <p>(1)</p>	 <p>(1)</p>	 <p>(1)</p>

c) Identify the components of a typical floor construction in buildings as indicated below. (4)

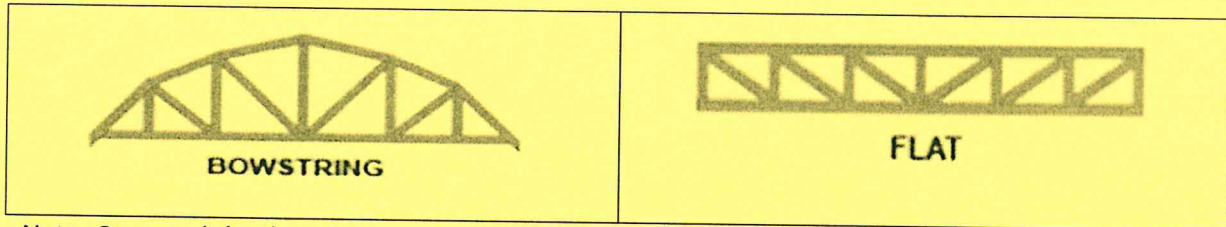


*Note: Half (0.5) mark for each floor component identified*

d) What are the four (4) main purposes for which hardcore is placed as the bottom-most layer in ground floor construction? (4)

- To ensure consistent material over the whole floor area so that the loading of the floor is uniformly spread over the whole area. (1)
- To reduce, by means of voids, the passage of moisture from the ground. (1)
- To fill areas which, after topsoil removal, are below the required floor level. (1)
- To provide a clean, dry and firm working surface. (1)

- e) Identify the following types of building roof trusses. (3)



Note: One mark (1.5) each for each type of truss identified.

- f) State the four (4) requirements of any building foundation. (4)
- *Should safely sustain and transmit to the ground the combined dead and imposed loads so as not to cause any settlement or other movement in any part of the building or of any adjoining building or works.* (1)
  - *Should be of such depth or be so constructed as to avoid damage by swelling, shrinkage or freezing of the subsoil.* (1)
  - *Should be capable of resisting attack by sulphates or other deleterious matter present in the subsoil.* (1)
  - *It must also anchor the building's superstructure against uplifting and cracks due to wind or Earthquake forces.* (1)
- g) Outline the six (6) functions of the external walls of a building. (3)
- *Support upper floors and roofs together with their superimposed loads.*
  - *Resist damp penetration.*
  - *Provide adequate thermal insulation.*
  - *Provide sufficient sound insulation.*
  - *Offer adequate resistance to fire.*
  - *Look attractive and satisfactorily accommodate windows and doors.*

Note: Half (0.5) mark for each function.

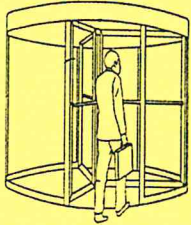

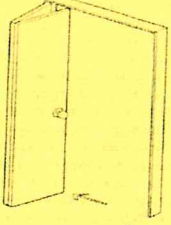
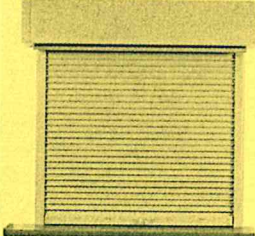
- h) In your own words define purpose made doors and give 3 examples of building in which they are usually found? (2)
- Purpose made doors are used to achieve desired requirement in buildings, e.g. banks, civic buildings, shops, theatres and hotels, churches to blend with or emphasize the external façade (most prominent architectural features) design* (2)

[30]



**Question 4**

- a) Identify the following types of doors. (2)

i) <i>Revolving door</i>	ii) <i>Pivot door</i>	iii) <i>Side Hinged folding</i>	iv) <i>Door Shutter</i>
 <p>(0.5)</p>	 <p>(0.5)</p>	 <p>(0.5)</p>	 <p>(0.5)</p>

- b) Factors affecting the choice of materials for a roof structure include the type of roof required and the costs involved. Briefly explain these two factors. (3)

*Type of roof required - Most low-rise buildings will be pitched roof but, in some cases, such as for commercial or industrial buildings, flat roofs may be used. Both pitched and flat roofs will need to perform the functions required for the rest of the external envelope. Increased loading will affect the design and may affect the material used for the roof structure. (1.5)*

*Care must be taken to consider the 'full' costs with regard to the selection of a roof structure. When considering timber roof structures for low-rise buildings the choice will need to involve the different techniques and costs involved between site formed structures, such as a strutted purlin roof, and prefabricated roof trusses systems. (1.5)*

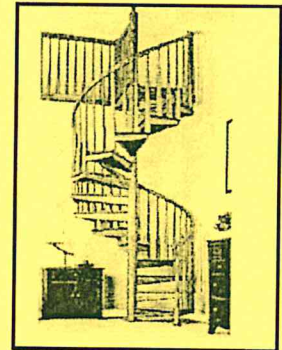
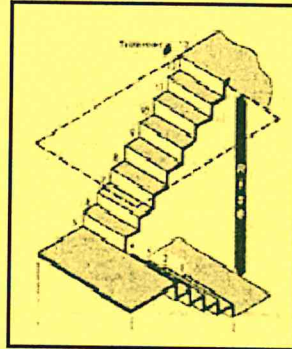
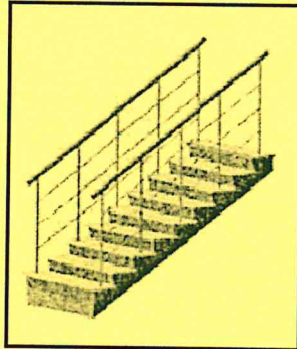
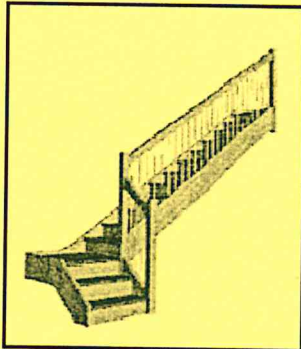
c) Identify each type of stair construction below and produce their respective sketch plan. (8)

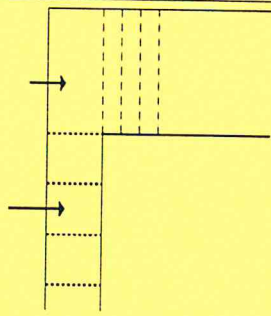
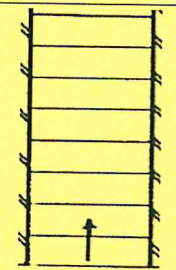
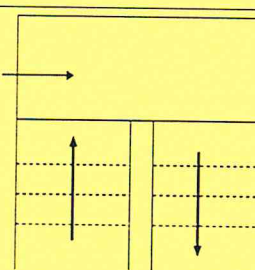
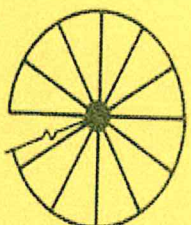
i)

ii)

iii)

iv)



<p>i) Quarter turn stair (1)</p>	<p>ii) Straight flight stair (1)</p>	<p>iii) Dogleg/Half Turn stair (1)</p>	<p>iv) Spiral stair (1)</p>
 <p>(1)</p>	 <p>(1)</p>	 <p>(1)</p>	 <p>PLAN</p> <p>(1)</p>

d) Distinguish between a Damp proof Course and Damp proof membrane (2)

*A Damp-Proof Course (often abbreviated to DPC) is a horizontal barrier in a wall designed to resist moisture rising through the structure by capillary action – a phenomenon known as rising damp.* (1)

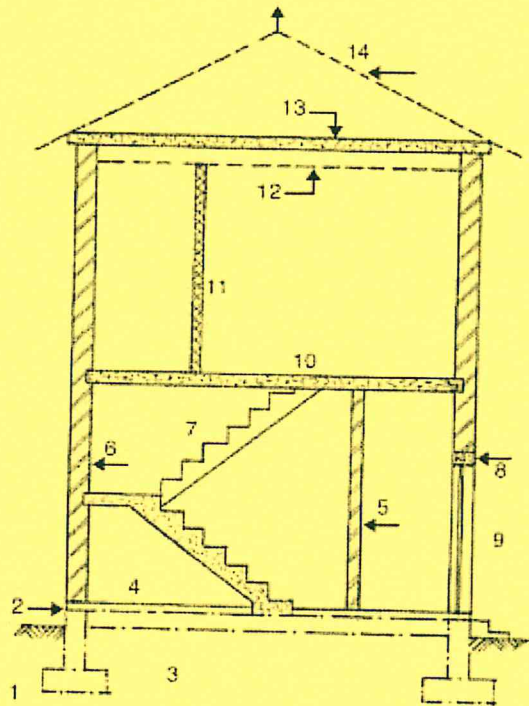
*A Damp-Proof Membrane (often abbreviated to DPM) is a wider membrane and comes in large sheets or rolls, and typically does a similar job resisting moisture penetration from under a whole foundation floor slab (or through the sides of basement walls).* (1)

[15]



**Question 5**

- a) Study the diagram below and identify the important parts of a building. (7)



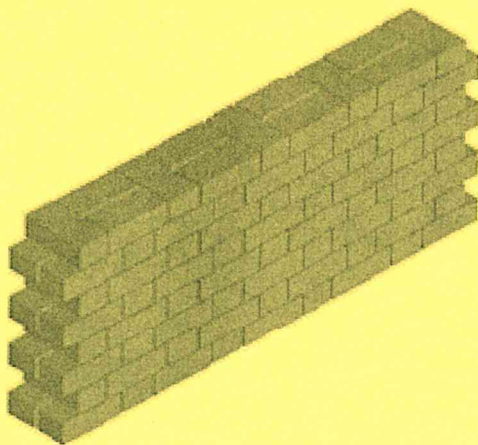
Parts of a building: 1. Foundation, 2. Plinth, 3. Basement filling, 4. Ground floor, 5. Internal wall, 6. External wall, 7. Staircase, 8. Lintel, 9. Door, 10. Upper floor, 11. Partition wall, 12. Ceiling, 13. Flat roof, 14. Sloping roof.

Note: Half (0.5) mark for each part

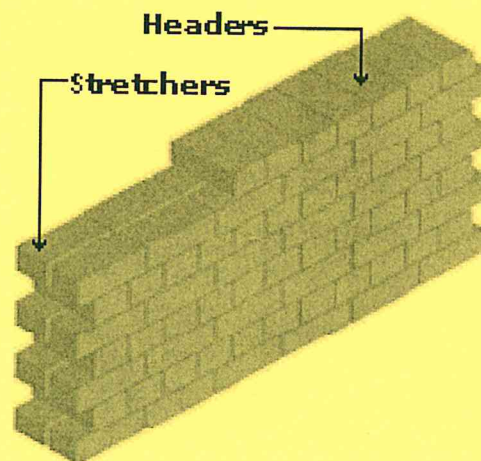
- b) Produce an orthogonal drawing of the following types of building components and label them appropriately.

- i) A Flemish bond and English bond (2)

*Flemish Bond (1)*

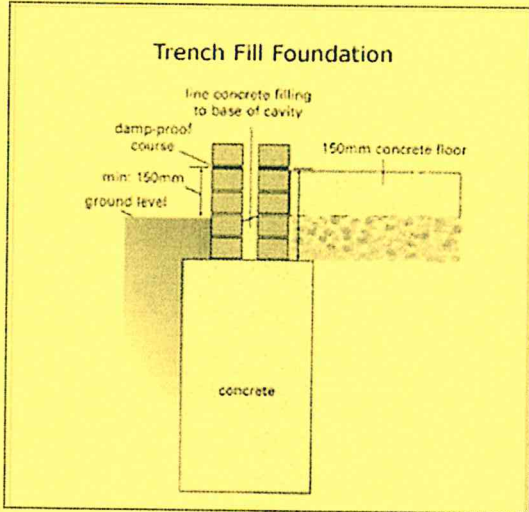


*English Bond (1)*

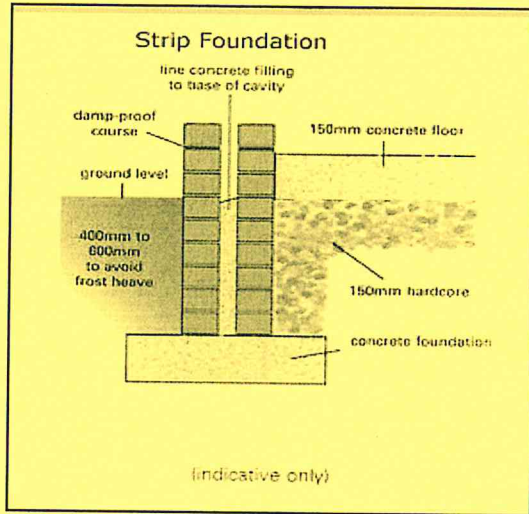


- ii) A Deep strip foundation and a Strip foundation. (2)

*Deep Strip foundation*

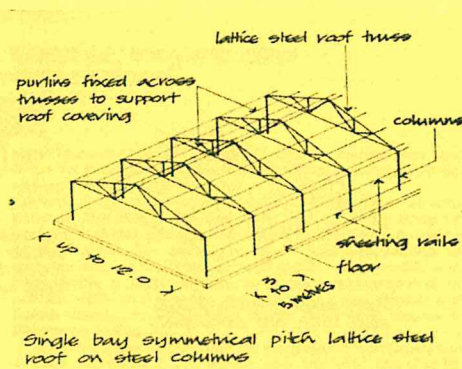


*Strip foundation*

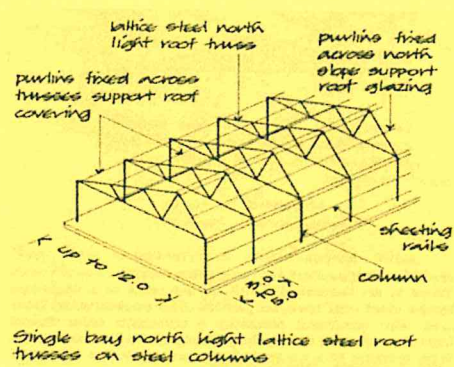


- iii) Symmetrical Lattice roof and Asymmetrical Lattice roof (1)

*Symmetrical Lattice roof*



*Asymmetrical Lattice roof*



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End of Memorandum