2012 Architectural Technology

Higher

Finalised Marking Instructions

SECTION A

Marks

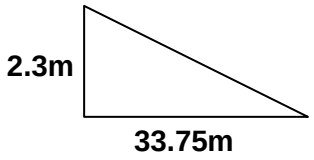
Attempt all questions in this Section (total 40 Marks)

1. State **two** *functions* of the ground floor of a domestic building.

Provide stability
A level surface for occupants
Support for walls **2**

2. A straight road is shown on a map to have two spot heights of 11.2m and 13.5m. The scale of the map is 1:1252 and the spot heights are measured at 2.7cm apart. Determine the gradient of the road.

Difference in height 13.5 – 11.2 = 2.3m **1 mark**
Distance 2.7 x 1250 = 3375cm = 33.75m **1 mark**



Sketch ***one mark***

Gradient 6.8% or 1 in 14.7 ***one mark*** *for correct answer* **4**

3. Briefly describe **two** ways in which *quality assurance* is maintained in house building.

Building Warrant
House Builders Guarantee
Trades Association
Site based checks on workmanship

One mark for each plus one mark for description **4**

4. Briefly describe **two** *financial constraints* that will influence the design of a domestic building project.

Funding
Loans
Purchase of materials
Purchase of land
Machinery

One mark for each plus one for description. **4**

Marks

5. State a suitable scale for a Site Layout Plan and two items of information that may be included on this Plan.

Suitable Scale 1:500 ***two marks***
Items of information:
- *Adjacent sites*
- *Trees*
- *Drains*
- *Outlines of buildings (existing or proposed)*
- *Large rocks*
- *Obstacles*
- *North point*
- *Adjacent roads*
- *Drawing Title Block*

Any other reasonable answer for one mark each. **4**

6. Briefly describe, with the aid of an annotated sketch, the purpose of a *check line* when carrying out a Linear Survey.

A check line is a diagonal line which is measured during the survey ***one mark***
Usually measured across two opposite corners of the site ***one mark***
Transferred to the Site Plan to check the accuracy of the drawing ***two marks*** **4**

7. Briefly explain what is meant by the term *Whole Life Costs* in relation to a building project?

All expenses incurred from the beginning of the design process through to the building being demolished ***two marks***
Includes other items such as windows, maintenance, running costs, improvements such as extensions, which occur during the life of the building – any two reasonable examples ***two marks*** **4**

8. Briefly describe, with the aid of an annotated sketch, what is meant by the *Central Meridian* in relation to the *National Grid*.

Suitable sketch ***two marks***
Description – the Central Meridian is a line of Longitude which bisects the Country ***one mark***
North and South line of the National Grid run parallel to it ***one mark*** **4**

Marks

9. Many different materials are used in the construction industry.

(i) Identify **one** material for which the strength to weight ratio is an important property and briefly describe where it may be used in a building.

Timber – anywhere in the frame/structure where timber is used to provide strength and stability. **3**

(ii) Identify **one** material for which fire resistance is an important property and briefly describe where it may be used in a building.

Brickwork/concrete – walls prevent the spread of fire, sound etc

One mark for a suitable material and two marks for an appropriate description. **3**

10. Briefly describe the difference between a *permanent* and a *temporary* Benchmark created during a survey.

A permanent benchmark is usually chiselled onto the side of a building by the Ordnance Survey Department, showing the height of a particular point above Ordnance Datum. As a permanent benchmark may not be available or convenient to use on a site, a temporary benchmark is created from a nearby permanent benchmark for temporary use during the building project. **4**

(40)

[END OF SECTION A]

SECTION B

Attempt any TWO questions in this Section (total 60 Marks)

Marks

11. (a) State the **two** types of local *Planning Permission* and briefly explain the differences between them.

Outline Planning Permission (Planning in principle)
Full Planning Permission ***one mark each***

Outline permission may simply require a site plan and location plan and a brief description of the proposed works to enable a decision to be made before detailed and expensive work starts.
Full permission requires detailed information on the exact work proposed along with materials and any other information which might be relevant to the area in which it was built.

One mark for each description. **4**

(b) Briefly describe two methods of how *thermal efficiency* can be maintained in domestic buildings.

Use of materials and construction with good insulation values in new building or the addition of insulation to existing buildings.
Use of heat recovery, solar gain, solar panels, heat pumps etc.

One mark for each description. **4**

(c) Briefly describe, with the aid of annotated sketches, how you would survey a *curved boundary* during a Linear Survey.

Create a Datum Line.
Divide the datum line into equal appropriate sized divisions.
Measure at 90º from all the data line intervals and note measurements.
Transfer measurements to Site Note Book.

6

Sketch two marks and one mark each for the above.

(d) **Worksheet Q11b** shows a map reference; determine the map references for grid squares **A**, **B**, **C** and **D**.

A=SJ3648SE
B=SJ3748NW
C=SJ3747NW
D=SJ3748SE

Two marks for each correct answer **8**

Marks

(e) Briefly describe four factors that would have to be considered when planning a new building beside older existing buildings in a city centre.

Aesthetics of the surrounding buildings.
Materials available for the new building.
Design of the new building to compliment the surroundings.
Planning permission.
Access.
Stability of existing buildings.
Site details.

One mark for each factor and one mark for description. **8**

(30)

12. (a) Briefly compare **three** *functional requirements* of the entrance to a High Street bank and those of the entrance to a detached bungalow.

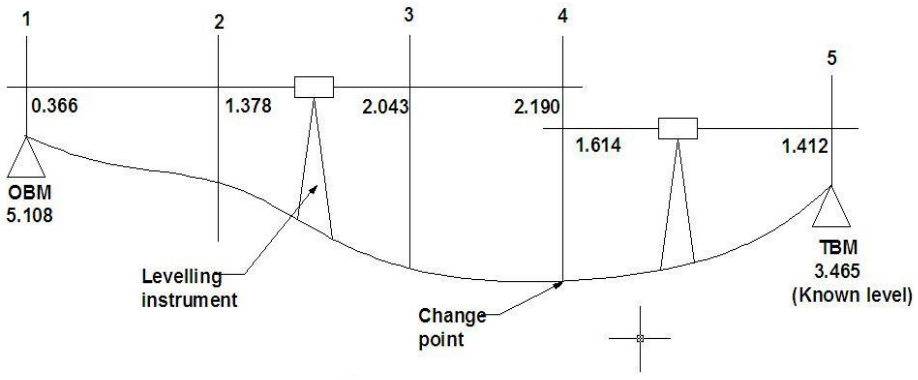
Each one would have different requirements for – space, materials used, ergonomics, lightning, fire escape, environmental control, access, security etc.

One mark for each appropriate functional requirement and one mark for valid comparison. **6**

(b) **Figure Q12b** shows a set of levels taken during a survey of a construction site.

Using **Worksheet Q12b.**

(i) Book the levels; **5**
(ii) Reduce the levels using an appropriate method; **5**
(iii) Carry out an appropriate arithmetic check on the reduction; **2**
(iv) State the magnitude of the closing error in the survey and suggest a reason for this error. **2**



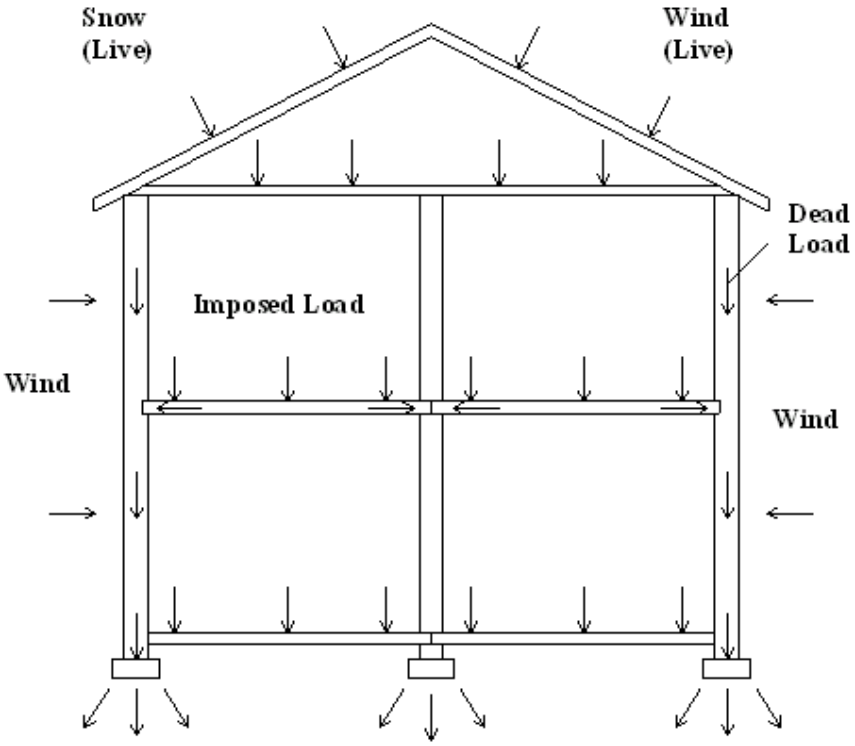
All dimensions in metres

Figure Q12b

Marks

(c) Domestic buildings are subject to live, dead and superimposed loads.

(i) Briefly describe with the aid of an annotated sketch how these loads are transmitted through the building.



Sketch three marks, three annotations one mark each. **6**

(ii) Briefly describe how structural stability is achieved at the junction of the roof and wall.

By skew nailing of roof trusses to wall plate or Truss clips could be used. Wall plate anchor straps should also be used. **2**

(d) Briefly describe **one** *demographic trend* that could influence the design of a building development.

Ageing population, smaller families, young people leaving home earlier etc.

One mark for a relevant trend and one mark for description. **2**

(30)

Marks

13. Refer to the 1:1250 scale map and answer the following questions:

(a) Identify the item that is contained in the map at the grid reference 3035985898.

El Sub Station ***two marks*** **2**

(b) Identify the grid square 30378589 and identify six items of detail within its plan square.

Town House
TCBs
Tollbooth
Public House
Museum
Hotel
Bakery
Hall

One mark for each correct item **6**

(c) Determine the average gradient of Gordon Street between points **A** and **B**.

Difference in levels 18-8.5=9.5m ***one mark***
Horizontal distance 140m approx. ***one mark***

Gradient = 6.8% or 1:14.7 ***one mark*** **4**

(d) After a Linear Survey it was suspected that a 50m tape was non-standard. When checked against a known baseline of 202.600m the distance read using the tape was 202.537m. Has the tape stretched or shrunk and by how much from its standard length?

The tape has stretched ***one mark***

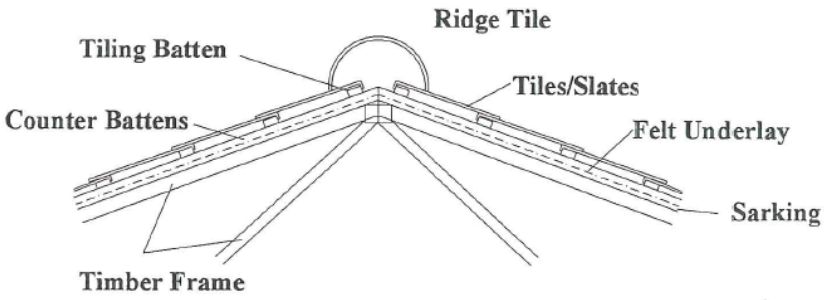
202.537/50=4.05 tape lengths ***one mark***
202.60-202.537=0.063 total length of stretch ***one mark***
0.063/4.05=0.016 stretch from standard length ***one mark*** **4**

Marks

(e) Briefly explain the *function* of a **ventilation brick** and identify where it should be located in the brickwork of an external wall.

It allows the air to circulate in areas such as under suspended floors and between walls to prevent condensation ***one mark***
Would be on the outer wall in brickwork or blockwork ***one mark*** **2**

(f) Prepare an annotated sketch to show the Ridge Detail requirements for a typical domestic dwelling.



8

(g) Briefly describe two advantageous properties of plastics and state two of their uses in house building.

Light weight, thermal insulation levels, easy to manufacture into complex shapes, low cost ***one mark for each property***
Used in door/window frames, electrical sockets, skirting boards, plumbing pipework etc, gutters

One mark for each relevant answer. **4**

(30)

[END OF SECTION B]

[END OF MARKING INSTRUCTIONS]