NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2016

CIVIL TECHNOLOGY

MARKING GUIDELINES

Time: 3 hours 200 marks

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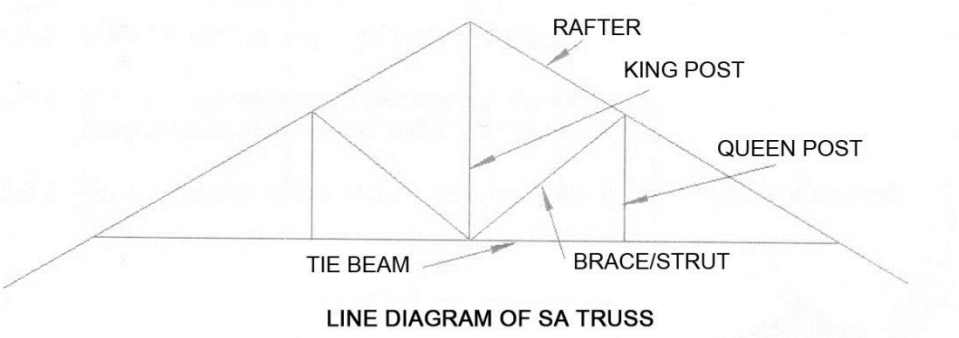
QUESTION 1 CONSTRUCTION, SAFETY AND MATERIAL

1.1 1.1.1 – E
1.1.2 – G
1.1.3 – I
1.1.4 – B
1.1.5 – C

1.2 Trench safety
Check daily especially after rain
Must be cordoned off
Access and exit must be accessible
Must be shored so that cave-in does not occur
No vehicles or heavy machinery close to trench
Warning lights placed for public safety
Any FOUR or other applicable answer

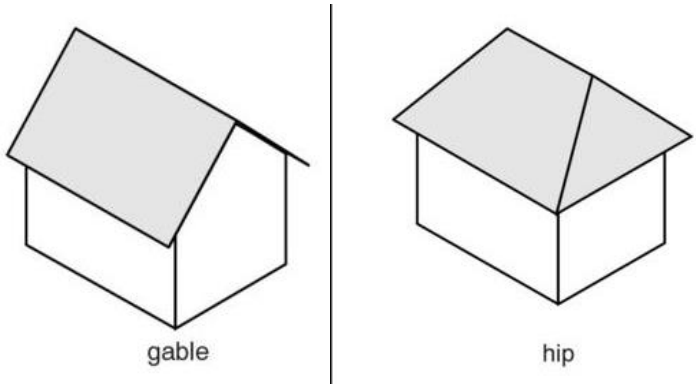
1.3 1.3.1



LINE DIAGRAM OF SA TRUSS

Any 3 labels and 1 for correctness of drawing

1.3.2 Draw a neat drawing to indicate at wall end the difference between a GABLE roof and a HIPPED roof.



2 Correct drawing 2 Correct drawing

1.4 Site safety
Site should be neat and tidy
Provisions for toilet facilities
No unauthorized entrance onto site
Site must be fenced off
Warning signs in applicable places
First Aid must be available
Workers must wear appropriate safety clothing
Any TWO or other applicable answer

1.5 1.5.1 Tapered cone, spirit level, measuring tape, tamping rod
Any ONE correct

1.5.2 Used to test correct mix between ingredients
Used to test correct consistency
Used to test correct water volume
Any ONE correct

1.5.3 Compression test
To test compression strength of concrete

1.6 1. I-beam
2. Channel iron
3. H-bar/two-sided channel

1.7 1. Head plate
2. Stud
3. Panel board, Gypsum board, cladding, plywood, chipboard (any one)
4. Sole plate

QUESTION 2 ADVANCED CONSTRUCTION AND EQUIPMENT

2.1 Check that blades are sharp
Keep away from moisture, rust
Cover cutting edges
Put away in safe place and clean after use
Place in tool-box
Check the power cord is not frayed or damaged
Any THREE or other applicable answer

2.2 2.2.1 Independent scaffold
Pipe scaffold
Any ONE correct

2.2.2 Bracing and used to keep scaffold secure

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2.2.3 Ensure it is on level ground
Working platform can carry load
Kick board in place
Guard rail in place
Qualified person erected scaffold
No paint or rust visible
Ensure tied onto structure
Only workers allowed on scaffold
Any TWO or other applicable answer

2.2.4 A – Guard rail
B – Platform
C – Kick board
D – Vertical standard

2.3 2.3.1 Factors
- Span
- Weight of floor
- Load on floor
- Daily use for suspended floor
- Time available for construction
- Reinforcing method for floor

Any THREE factors or any other applicable answer

2.3.2 Method – Precast concrete slab OR slab on corrugated iron OR reinforced slab

2.4 ANSWER BOOKLET

2.5 B – Shuttering
C – Rise
D – Tread
E – Landing
G – Wedges

2.6 Strong enough to carry load
Easily nailed, screwed
Reusable
Not able to bond with concrete
Any TWO applicable or any other applicable answer

2.7 Driven pile – Driven into soil with weight, like a nail driven into wood
Precast pile – Already made up pile driven straight into the ground
Drilled pile foundation – Hole is drilled by large auger drill bit and poured afterwards
Any TWO applicable answers

2.8 12 – Number of bars
Y – High yield/ Y-bar
12 – Diameter of bar
10 – Bar number in code
300 – Spacing of bars

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2.9 Rough arch – Plastered when finished
Built with uncut bricks
Mortar wedge shaped
Any ONE answer or any other applicable answer

Gauged arch – Built with voissoirs (purpose made bricks)
Do not plaster.
Any ONE answer or any other applicable answer

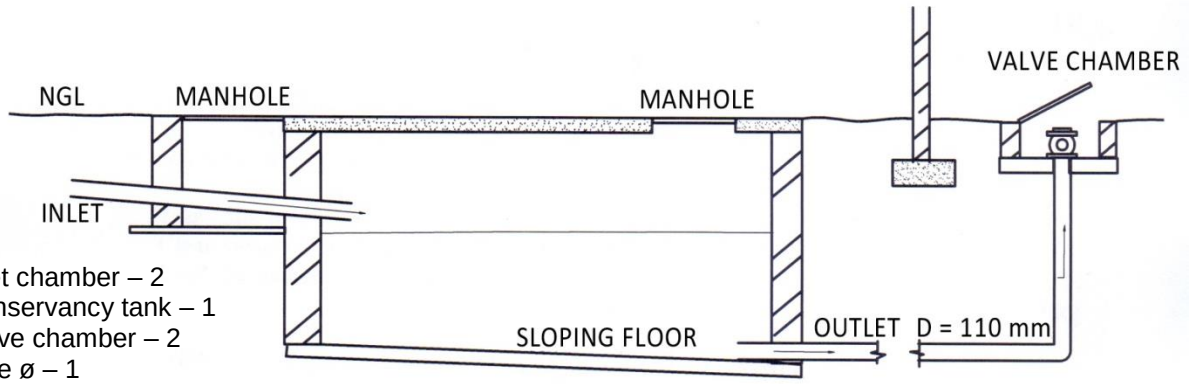
2.10 2.10.1 Curing of concrete – Drying, removal of water out of mix

2.10.2 Segregation of concrete – The concrete breaks apart due to mix not done properly

2.10.3 Beam filling – Bricks placed between trusses to close gap between wall and roof

QUESTION 3 CIVIL SERVICES

3.1 A conservancy tank can be used in the absence of a waterborne sewerage system and where a septic tank is not viable. Make a neat, labelled sketch of the sectional view of a conservancy tank. Clearly showing the following:
Inlet, outlet, valve chamber, pipe diameters and floor slope, manhole cover.



Inlet chamber – 2
Conservancy tank – 1
Valve chamber – 2
Pipe ø – 1
Outlet – 1
Floor slope – 1

3.2 ANSWER BOOKLET

3.3

ADVANTAGES	DISADVANTAGES
Excellent coastal areas *Readily available* *Durable in aciduous soil*	*Expensive* *Joints laborious, difficult*

3.4 3.4.1 Trap consists of sieve that stops food going into main drain
Clean sieve and pipes can be unblocked quickly
ANY other acceptable answer

3.4.2 **Used:** Restaurants, large kitchen
ANY other acceptable answer

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QUESTION 4 QUANTITIES, MATERIALS AND JOINING

4.1 Fixatives

4.1.1 General use where nail can be visible
Carpentry
Crates
Any ONE or other acceptable answer

4.1.2 The large head of the clout nail holds the ceiling material better

4.1.3 Use where large nail is unsuitable
Use where nail must be hidden
Use where wood is in danger of splitting
Any ONE or other acceptable answer

4.1.4 PVC cement/glue

4.1.5 Soldering
Compression fittings

4.2 Advantages of screws
Does not damage the wood when inserting
Easy to take out and does not damage wood, when taking out
Grip is much stronger
Holds longer than nails
Any THREE or other acceptable answer

4.3 Incomplete cutting list
4.3.1 Description
4.3.2 Width
4.3.3 Thickness

4.4 ANSWER BOOKLET

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QUESTION 5 APPLIED MECHANICS

5.1 5.1.1 Rec 1 = 30 × 20 = 600 mm²
Rec 2 = 20 × 20 = 400 mm²
Rec 3 = 40 × 90 = 3 600 mm²
Total = 4 600 mm²

5.1.2 CENTROID FROM AA

4 600 × X = (600 × 15) + (400 × 40) + (3 600 × 75)
= 9 000 + 16 000 + 270 000
= 295 000/4 600
= 64,13 mm

5.2 ANSWER BOOKLET

5.3 RR × 5 = (3 × 0) + (4 × 1) + (5 × 3) + (4 × 4)
= 0 + 4 + 15 + 16
= 35/5
RR **= 7 kN**

RL × 5 = (4 × 1) + (5 × 2) + (4 × 4) + (3 × 5)
= 4 + 10 + 16 + 15
= 45/5
RL **= 9 kN**

QUESTION 6 GRAPHICS AND COMMUNICATION

6.1 ANSWER BOOKLET

6.2 ANSWER BOOKLET

Total: 200 marks

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