

Q1) Types of artificial foundations

- i) Raft foundation
 - ii) Strip foundation
 - iii) pad foundation / independent foundation
 - iv) Deep strip foundation
 - v) concrete foundation
 - vi) piled foundation
 - vii) stepped strip foundation
 - viii) stone foundation
 - ix) composite foundation
 - x) combined foundation (continuous foundation)
 - xi) Reinforced concrete foundation
 - xii) Timber foundation
 - xiii) steel foundation
 - xiv) cofferdam foundation
 - xv) brick foundation
- (Any 4, 1 mark each)

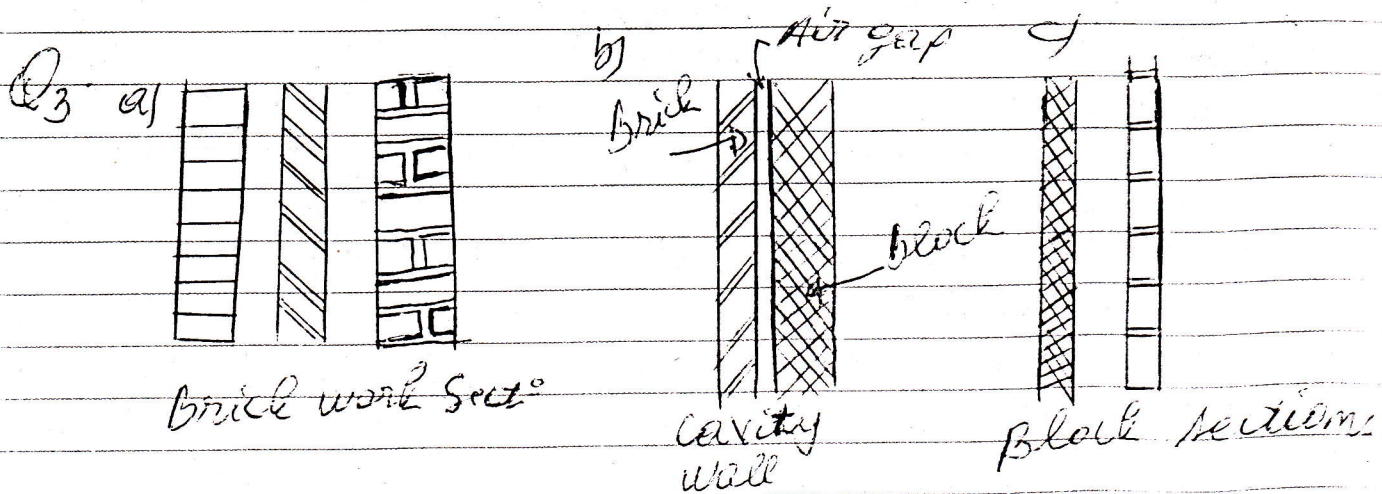
4

Q2: State four types of walls according to loads:

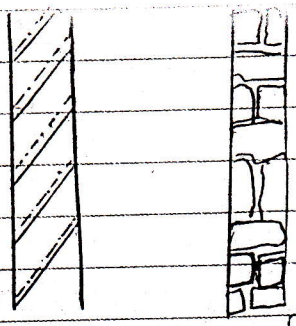
- i) Load bearing internal wall
- ii) Non-load bearing internal wall
- iii) Load bearing external wall
- iv) Non-load bearing external wall
- v) retaining wall

(Any 4, 1 mark each)

4



4



Stone section.

(1 mark for each)

Q4. Discuss the use of the following hand tools as used in the site preparation?

- a) Pick: for breaking up hard ground
- b) Axe: for chopping down trees
- c) Spade: for shifting/lifting soil, sand etc.
- d) Sledgehammer: for breaking up stones or other heavy materials & hitting posts into ground.

(Analyse the candidate's answers)
(1 mark each)

4

Q5. Explain the purpose the following measuring tools in construction works.

- a) Tape measure: for taking measurements
- b) Builder's level: for checking horizontal and vertical levels
- c) Plumb-line: for checking vertical levels
- d) Builder's square: for making right angled corners.

(Analyse the candidate's answer)

1 mark each

4

Q6. Things that can be cleared from site during site preparation

Do not write this mark

- i) Bushes/Vegetation
- ii) Scrubs
- iii) Trees
- iv) Roots of trees
- v) Termites
- vi) Stone/Rocks
- vii) unwanted features

(4)

(Any 4, 1 mark each)

Q7. Things that can be identified from the tests on the soil from a trial hole:

- i. Type of soil
- ii. Colour of soil
- iii. Grain size
- iv. Soil composition/particle size of distribution
- v. Soil strength/bearing capacity
- vi. Moisture content/water content
- vii. Contaminated soil
- viii. presence of stones/rocks
- ix. level of water table.
- x. type of foundation to be used
- xi. information about best method of excavation
- xii. Nature of soil
- xiii. Variations of soil level layers.

(Any four element) 1 mark each)

Q8. Describe four steps/stages how you can make profile boards for setting out and how you can use them to locate partitions of walls and foundations.

1. preparation of boards and pegs (profile)
2. Attach a horizontal board to two timber posts and sharpen the posts at one end to stick in ground.

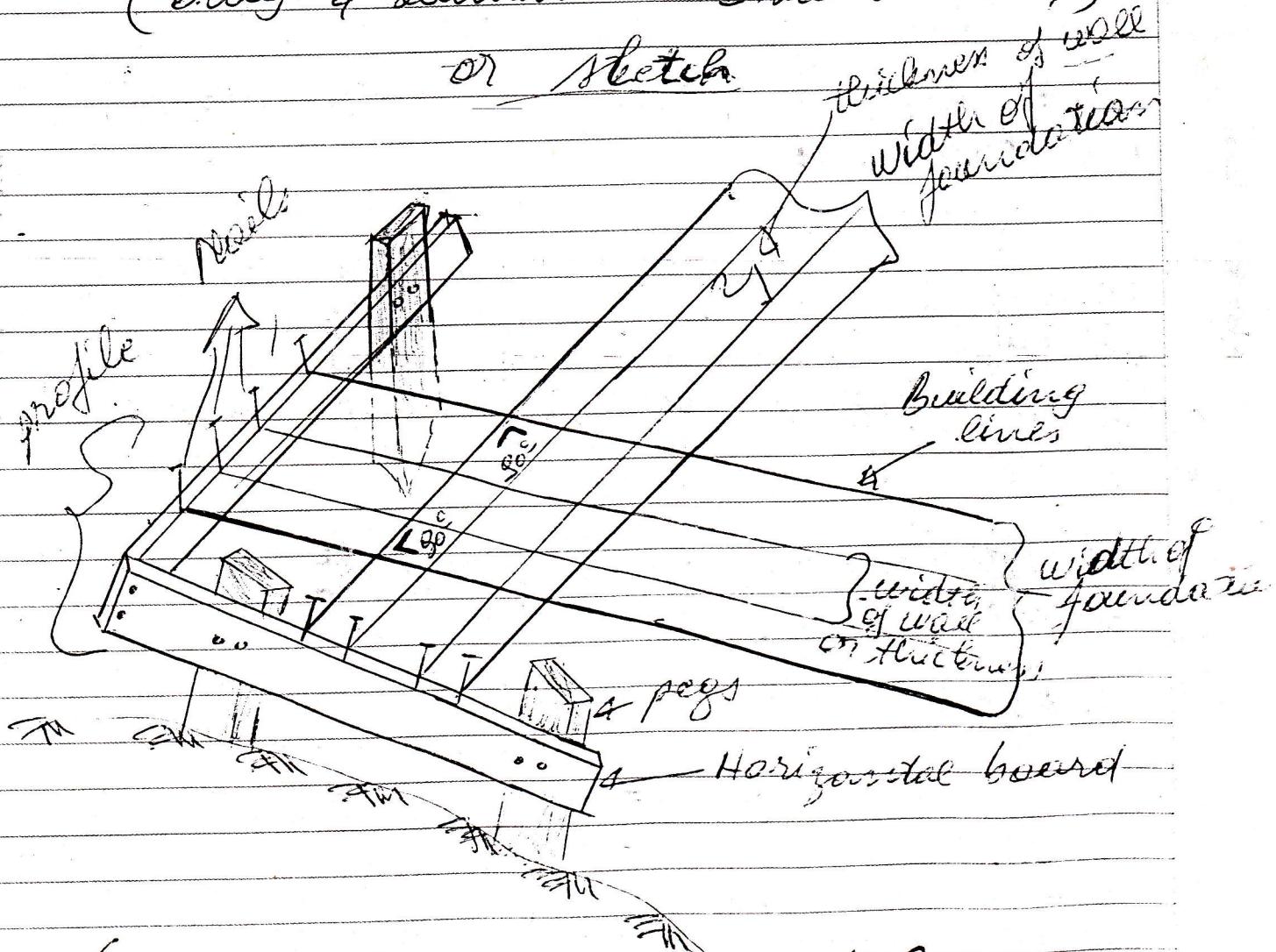
3. Mark the top of the board with nails to show the width of the wall and foundations at the corners.

4. Place a pair of profiles in the ground beside the pegs used for setting out and check that the angles are still 90° .

5. Stretch lines between the profiles at the corners of the buildings. Use nails to locate the position of the walls and foundation

OR Sketch
(Only 4 elements 1 mark each)

OR Sketch



(Full mark to the well labelled sketch)

2

Q9. Types of excavations that can be done on a building site for a small building.

Do not write in this margin

- i. Removing top soil
- ii. Reducing levels to make uneven working surface
- iii. Trenches for strip foundations
- iv. Pits for piers and columns
- v. Holes for piles
- vi. Digging a sloping site
- vii. Digging stepped foundation
- viii. Digging out basements
- ix. Open excavation
- x. Sanitary services excavation (septic tank)
- xi. Boring excavation

Any four elements 1 mark each

4

Q10. Explain timbering in excavation works

Timbering is the supporting of sides of excavated trenches using metal sheets, timber etc, to hold loose soils from falling and to provide security of workers working in excavation. 1 mark.

Analyse candidate's answer.

no. 6) Different between Natural and artificial foundation.

- i. Natural foundation: is the ground underneath the base of artificial foundation. 1 mark
- ii. Artificial foundation is the constructed part of the structure mostly under the ground level which supports the loads of the entire structure. 1 mark.

Analyse the candidate's answer

of Bulldozers removes the top soil and reduce levels 1 mark

4

Q11

RCC: Reinforced cement concrete
2 marks

Do not
write in
this margin

Q12 The materials used in RCC

- i. water
- ii. cement
- iii. sand (fine aggregates)
- iv. gravel (course aggregates / ballast)
- v. Reinforcement bars (Steel)
- vi. Admixtures

(any 4, $\frac{1}{2}$ mark each)

2

Q13 Structural parts of a simple building which can be constructed in reinforced concrete:

- i. Foundation base / Footing
- ii. Columns
- iii. pillars
- iv. Floor slab / ceiling
- v. beams (lintel)
- vi. Roofs slabs
- vii. Arches
- viii. stairs
- ix. lintel
- x. ceiling.
- xi. wall
- xii. gutter
- xiii. Septic tank
- xiv. water tank
- xv. Ramp
- xvi. newel posts.

(Any four elements $\frac{1}{2}$ each)

4

Q14 Importance of compacting concrete
concrete is compacted to remove trapped air gap (voids) after it is poured in position in order to make it dense so that it should resist compressive forces.

2 marks
Analyse the candidate's answer

2

Q15. State the main structure purpose of using steel reinforcement bars in concrete

- answer: - They resist the tension forces in concrete
- to control Shrinkage ^{in concrete structures} ~~in beams~~
- to resist torsion forces
- to supplement the compression resistance to the concrete

(Any 1, 2 mark)

2

Q16 SECTION B - PART - 1

Five facilities found on a healthy construction site to help in hygiene.

- i. Shade for rest
- ii. Dry area to prepare food
- iii. washing facilities
- iv. Toilets
- v. Clean drinking water
- vi. Area to hang wet clothes
- vii. A change room / dressing room or clothing room
- viii. A place to kitchen waste
- ix. site office
- x. workshop
- xi. Fence
- xii. Space for storing equipment and materials
- xiii. garages
- xiv. parking
- xv. Restaurant.
- xvi. access roads / access to the site within or
- xvii. electricity outlet.
- xviii. site bay (first aid, medicament) box (Site clinic)
- xix. Sign post
- xx. protective clothing

5

Do not write this mark

Q17 If a person has a sudden stop on the way the first-aid measures taken to help him are:

- i. Turn off electric current
- ii. Make the person comfortable with no movement
- iii. cover the person with clothing for warmth
- iv. check the heart beats (pulse rate)
- v. use artificial respiration (help him to get fresh air / oxygen)
- vi. contact an ambulance.
- vii. Do not give him/her water.

Any five 1 mark each

5

Analyse the candidate's answer.

Q18. Sketch clearly the following:

- a) mass concrete
- b) Reinforced concrete
- c) cement and sand breeze
- d) Earth
- e) Hardcore

1 mark each

5

Q19 Define the meaning of the following bricklaying works.

- a) Queen: a corner brick on an external angle
- b) closer: a brick cut in half along its length.
- c) bed joint: the horizontal mortar joint
- d) Annis: The straight edge of a brick
- e) Cut: a brick that is cut across its width.

(1 mark each)

5

20. All characteristics of external walls.

- i. Strength to resist being crashed by loads
e.g. from roofs
- ii. Stability to resist. eg wind pressure
- iii. weather resistance
- iv. good thermal ~~resistance~~ properties
- v. Durable
- vi. Fire resistant
- vii. provide for daylight & Ventilation openings
- viii. Beautiful / esthetic view - good appearance
- ix. Strong for security
- x. Economical. etc.

(Any five 1 mark each) (5)

SECTION B - PART 2

21. Mention five purposes of the distance between reinforcement bars and the concrete surface call cover:

- i. protect steel from corrosion due to atmospheric water.
- ii. protect steel from corrosion due to poor compaction or segregation.
- iii. provide enough concrete to make a good bond
- iv. Insulate the steel from early failure in a fire
- v. To meet the steel design specifications
- vi. For beauty.
- vii. Facilitation of structure finishing
- viii. Additional resistance of concrete.

(Any 5 elements 1 mark each) (5)

22. Describe the ~~necessary~~ five precautions taken on site to ensure cement is in excellent condition

- i. Check the manufacturer's date on the bag, cement quality becomes poor with age/time
- ii. ~~store~~ ~~store~~ cement bags with water proof bags.

ii. Store cement bags in a room where there is not too much moisture in the ground.

Do not write in this margin

iii. Cover the bags with water proof bags.

iv. Do not stack bags too high because pressure from upper bags can spoil the lower bags.

v. Use cement in the order of receiving it to keep it from becoming stale

5

Any 5 I mark each

Analyse candidate's answer.

Q

Q3 How to do a Slump test

1) Prepare a base plate and put it on a horizontal rigid surface

2. Put mixed concrete in a metal cone on a flat base

3. Pack it down layer by layer with the tamping rod until the cone is full.

4. Level the top with a steel trowel

5. Remove the cone and the concrete will sag (slump)

6. Measure the distance from the top of the cone to the top of the slumped concrete. Compare this with the desired level of slump.

5

7. Increase or decrease the water in the mix to get the correct slump.

(Any 5 steps I mark each)

Analyse the candidate's answer.

Q) equipment or instrument used in reinforced concrete =

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- | | |
|---------------------------|----------------------|
| i. Vibrators | iii. Bending benches |
| ii. compactors | ix. Hammer and saw |
| iii. rollers | * Tape measure |
| iv. Hack saws | * wheelbarrow |
| v. Metal cutting machines | * pincers |
| * Trowel | * Spade |
| vi. concrete mixers | * gauge box |
| vii. Bending machines | * spirit level |
| | * Dumpers. * trucks |
- (any 5 1 mark each)

5

Q) 25) Modulus of elasticity: is the ratio of the linear strain is termed the modulus of elasticity or more commonly known as young's modulus

$$E = \frac{\sigma}{\epsilon} = \frac{F/A}{\frac{\Delta L}{L}} = \frac{FL}{\Delta LA}$$

where E = Modulus of elasticity
 ϵ = strain
 F = Force applied on material
 A = Section of material
 ΔL = change in length of material
 L = original length of material

ii. Strain

is a geometrical measure of deformation representing the relative displacement between particles in a material body.

$$\epsilon = \frac{\Delta L}{L} = \frac{F/A}{\frac{\Delta L}{L}} \quad \epsilon = \frac{\Delta L}{L}$$

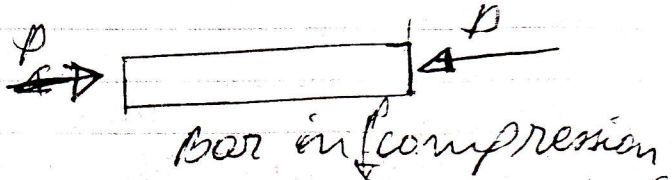
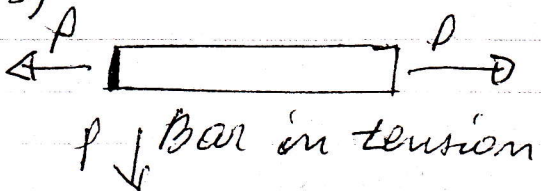
iii. Stress: is the average amount of force exerted per unit area.

$$\sigma = \frac{F}{A}$$

(1 mark each)

~~5~~

Q) b)



NA (1 mark each) 5

SECTION 2

Do not write in this margin

Q26 a) Building site: This is one piece/area of land or plot which is allocated or assigned for a building project it's owned by the client. 1 mark

b) Seven skills, experience or technical knowledge of a technician.

1. Help to prepare working drawings
2. Interpret the drawings prepared by architects
3. Understand building construction techniques
4. work on site efficiently
5. understand building regulations
6. Apply health and safety rules to their work
7. know how to operate equipment safely
8. Organise other building workers.
9. Carry out work to a high standard

15

Any 7 Elements 2 marks each

Analyse the candidate's answer

Q27. Meaning and function of the construct^o team:

- 1) Main constructor: A person employed by the client to construct the structure according to drawing specifications and bills of quantities.
- 2) Estimator: A person employed by the client who prepares bills of quantities and produce unit and total cost of construction materials of a building according to the drawing and specifications.
- 3) Surveyor: is a person for laying out the shape the building on the ground before construction starts.

'Tied' for large building project.

- 5) Site agent: Is the contractor's representative on site for large contract or large project.
- 6) General foreman: A person employed on small contract or project and have to extensive knowledge of all aspects of the building
7. Trade foreman: These are experienced people at specific trades such as brickwork, carpentry, plumbing, electricity, they organise and control workers.
8. Trade people: They are skilled and experienced people in their chosen trades typically bricklayers, carpenters, plumbers and electricians.
9. Apprentices: These are building workers who are learning the basic skills from the job.
10. Labourers: These ones carry out the job on a building site and they do not need special skills.

Analyse the candidate's answer.
(1.5 marks for each)

(28) Things that are investigated by a surveyor on a building site before the building works.

When the client identifies a site, then the building surveyor investigates it to find out the:

1. Strength of the soil, because this affects the design of the foundations.
2. Type of soil which will be excavated.
3. Amount of water in the ground because this

affects the design of the foundation and working procedures.

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4. Amount of clean or contaminated ground
 5. Amount of the ground slopes
 6. Access to services such as mains water, electricity and drainage.
 7. Best position of natural features such as trees, rocks and streams
 8. position of other buildings near the site
 10. location of site boundaries and access roads
 11. previous uses of the site
 12. ~~interagonistic condition~~ condition of the region
- (mark each of any 10 elements) (mark each)
- Analyse the candidate's answer.
13. Topography of site.
 14. Availability of material and workman