



Subject Name: FOUNDATION ENGINEERING

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Year and Sem, Department: IV/I CE

Unit-I: (Soil Exploration)

Important points / Definitions:

- **soil exploration:** Soil exploration refers to the study of obtaining soil samples for the investigation of its Engineering properties, location of water table and profiles earth strata.
- **soil investigation:** Soil Investigation Report or Soil reports, also called “geotechnical soils reports” are prepared by a licensed geotechnical engineer or a registered civil engineer experienced in soils engineering. They are required in areas with expansive or low strength soils.
- **depth of exploration:** Soil explorations are made in each bed below the foundation to a depth of at least 1 - 1/2 times the breadth of the foundations.
- **soil boring test:** A Soil Boring Test: is a type of geologic engineering tests to determine the capability of the soil or to determine the strength and properties of a required building foundation.
- **Refusal:** The condition reached when a pile or a soil sampler being driven by a hammer has negligible penetration from each blow of the hammer Occurs when very hard soil or rock is encountered. Also applies to cone penetration tests when the cone cannot advance further.
- **CPT:** CPT refers to Cone Penetration Test. The Cone penetration test can be carried out from the ground surface with a need for a borehole. The test is carried out by first pushing the cone into the ground at a standard velocity of 1 to 2 cm/s while keeping the sleeve stationary. For any depth, the resistance of the cone, called cone penetration resistance q_c .
- **Sub Soil Exploration:** The process of collection soil data for the assessment soil properties at a site through series of laboratory and field investigation is collectively called Sub-soil Exploration.
- **DCPT:** DCPT refers to Dynamic Cone Penetration test. It is similar to SPT expect that for DCPT a cone is provide at the bottom.

ISHORT ANSWER QUESTIONS[2M]

1. What is the purpose of soil exploration? [NOV/DEC 2017]
2. Define the terms inside and outside Clearance, Area Ratio? [NOV/DEC 2017]



3. What is the purpose of soil exploration? [OCT/NOV2016]
4. What are the stages of site investigation? [NOV/DEC 2017]
5. What is soil investigation report? [OCT/NOV2016]
6. Why is soil investigation necessary? [NOV/DEC 2017]
7. What is the meaning of soil investigation? [OCT/NOV2016]
8. What are the geophysical methods of exploration?
9. What is a subsoil investigation? [APR/MAY 2017]
10. What is meant by disturbed sample? [APR/MAY 2017]

II.LONG ANSWER QUESTIONS [5M]

1. What are the different civil engineering projects where sub surface investigations is required? What kind of information is required in this investigations[NOV/DEC 2017]
2. What you meant by 'significant depth of exploration? Give to empirical guide lines which enable the determination of the depth of exploration? [NOV/DEC 2017]
3. What are the corrections that must to be applied to the field N value for sand before they are used in designed charts and empirical co-relations? [NOV/DEC 2017]
4. What are the circumstances which make the plate load test data misleading when used for explorations of prototype behavior? [NOV/DEC 2017]
5. What is meant by [NOV/DEC 2017]
 - a) Undisturbed samples
 - b) Representative samples
 - c) Recovery ratio
6. Explain briefly various methods of soil exploration techniques?
7. Explain briefly on Auger Boring?
8. Explain briefly on Wash Boring?
9. Write a detailed note on various types of boring techniques?
10. Explain briefly on Percussion Drilling?
11. Explain in detail Seismic Refraction Method?

CHOOSE THE CORRECT ANSWER

1. Foundations can be broadly classified under _____
 - a) **Shallow foundation and Deep foundation**
 - b) Pile foundation
 - c) None of the mentioned
 - d) All of the mentioned
2. A foundation is said to be shallow if its depth is _____ than its width.
 - a) **Equal to and Less than**
 - b) Greater than
 - c) None of the mentioned



- d) All of the mentioned
3. which of the following, is a type of shallow footing?
- Spread footing**
 - Pile foundation
 - Pier foundation
 - Well foundation
4. Which of the below is the most commonly used shallow foundation?
- Strap footing
 - Spread footing**
 - Combined footing
 - Raft footing
5. The pressure intensity beneath the footing depends upon _____
- Rigidity of the footing
 - Soil type**
 - Condition of soil
 - All of the mentioned
6. Once the pressure distribution is known _____ in the reinforced concrete footing can be calculated.
- Bending moment and Shear force**
 - Bearing pressure
 - None of the mentioned
 - All of the mentioned
7. In conventional design, allowable bearing capacity should be taken smaller than which of the following value?
- Safe bearing capacity and Allowable bearing pressure**
 - The pressure intensities beneath the footing
 - None of the mentioned
 - All of the mentioned
8. In cohesive soil, the pressure distribution beneath the footing is _____
- Linear**
 - Non linear
 - Zero
 - None of the mentioned
9. When do strap footings are used in foundation?
- To transfer load of an isolated column
 - Distance between the columns are long**
 - Two column loads are unequal
 - All of the mentioned
10. When two column loads are unequal, which of the possible footing can be provided?
- Strap footing



- b) Raft footing
- c) **Trapezoidal combined footing**
- d) Mat footing

Unit-II: (SLOPE STABILITY)

Important points / Definitions:

- slip failure: In a bank of homogeneous earth or clay, the slip surface of failure closely follows the arc of a circle that usually intersects the toe of the bank.
- finite slope: The term infinite slope is used to designate a constant slope of infinite extent. - The long slope of the face of a mountain
- stability Number: It is the method used to evaluate slope stability for homogeneous soils having cohesion.
- mobilized cohesion: Mobilized cohesion is the portion of the maximum cohesion developed along the slip plane or failure plane
- drained soil: Drained condition occurs when there is no change in pore water pressure due to external loading
- Undrained soil: Undrained condition occurs when the pore water is unable to drain out of the soil. In an undrained condition, the rate of loading is much quicker than the rate at which the pore water is able to drain out of the soil
- slope stability: Slope stability is the process of calculating and assessing how much stress a particular slope can manage before failing.
- natural slope: Slopes which are formed naturally and which exists in hilly areas are natural slopes
- Infinite Slope: The term infinite slope is used to designate a constant slope of infinite extent. The long slope of the face of a mountain
- Factor of Safety: It is the ratio of Resisting forces by Driving forces

SHORT ANSWER QUESTIONS [2M]

1. Distinguished between infinite and finite earth slope? [NOV/DEC 2017]
2. Define Finite Slope? [OCT/NOV 2016]
3. Define Infinite Slope.
4. Name various types of slope failure? [NOV/DEC 2017]
5. What are the causes of failure of slopes? [OCT/NOV 2016]
6. Write brief notes on Taylor's stability number? [OCT/NOV 2016]
7. What are different FOS used in stability of slopes? [NOV/DEC 2017]
8. What is critical height?
9. Explain the assumptions that are made in analysis of the stability of slopes? [OCT/NOV 2016]
10. Explain Under what conditions (i) a base failure and (ii) a toe failure occur?

LONG ANSWER QUESTIONS[5M]

1. Discuss the stability analysis of infinite slopes in cohesion less soils for no seepage condition?
2. Discuss the stability analysis of infinite slopes in cohesive soils?
3. Discuss the stability analysis of infinite slopes in cohesion less soils with ground water table at the surface of the slope?
4. Explain the stability analysis by Swedish slip circle method and derive the factor of



- safety?
5. Explain Bishop's simplified method for determination of factor of safety of a finite slope?
 6. Explain the basis for Taylor's stability number and the procedure of its use.
 7. Explain the method of slices for estimation of factor of safety of finite slopes.
 8. Describe the stability of slope of an earthen dam in sudden drawdown conditions?
 9. Explain stability of earthen dam in full reservoir condition?
 10. Discuss in detail different forms of slip surface in finite slopes?
 11. It is proposed to construct a highway embankment using a $c-\phi$ soil having $c = 20$ kPa, $\gamma = 17\text{kN/m}^3$. Determine the critical height up to which the embankment can be built with an inclination of 29° with a factor of safety of 1.50. Given the Taylor's stability number for these conditions as 0.0737?
 12. Find factor of safety of a 5m slope of infinite extent having a slope angle of 25° . The slope is made of cohesion less soil with $\phi = 30^\circ$, $\gamma = 17\text{kN/m}^3$, $\gamma_{\text{sat}} = 19\text{kN/m}^3$. Also analyze the slope if it is made of clay having $c' = 30\text{kN/m}^2$, $\phi' = 20^\circ$, $e = 0.65$ and $G_s = 2.7$ and under the following conditions:
 - A) When soil is dry
 - B) When the slope is submerged.

CHOOSE THE CORRECT ANSWER

1. Earth embankments or slopes are commonly required for which of the following purpose?
 - a) Railways
 - b) Earth dams
 - c) Road ways
 - d) **All of the mentioned**
2. The failure of slopes may take place due to _____
 - a) **Forces between the soil particle and High water content**
 - b) Action of gravitational force
 - c) None of the mentioned
 - d) All of the mentioned
3. Slopes is classified into _____ types.
 - a) **2**
 - b) 3
 - c) 4
 - d) 5
4. Which of the following is an example of slopes extending to infinity?
 - a) Inclined face of Earth dams
 - b) Embankments
 - c) Cuts
 - d) **None of the mentioned**
5. Analysis of stability of slopes is used for determining _____
 - a) **Shearing strength and Stressed internal surface**



- b) Properties of the soil
c) None of the mentioned
d) All of the mentioned
6. If the soil properties for all identical depths below the surface are constant, it is a _____
a) Finite slope
b) **Infinite slope**
c) Planar failure surface
d) All of the mentioned
7. A long natural slope of cohesion-less soil is inclined at 12° to the horizontal. What will be the factor of safety of the slope if $\phi = 30^\circ$?
a) 1.6
b) **2.7**
c) 0.13
d) 0.4
8. Factor of safety with respect to height is given by _____ equation.
a) **$FC = HC / H$**
b) $FC = C / Cm$
c) $FC = \tau f / \tau$
d) $FC = \tau C / \tau$
9. In the limiting case of stability, the angle of slope is referred to as _____
a) Angle of deviation
b) **Angle of repose**
c) Angle of unstable slope
d) All of the mentioned
10. The factor of safety against safety is given by _____ equation.
a) $F = HC / H$
b) **$F = \tau f / \tau$ and $F = \tan \phi / \tan i$**
c) None of the mentioned
d) All of the mentioned

Unit-III: (EARTH PRESSURE THEORIES)

Important points / Definitions:

- This method is proposed by the Taylor. It is based on the principle resistance of soil mass against sliding, because of cohesion and internal friction acting over the failure plane.
- Mobilized cohesion is the portion of the maximum cohesion developed along the slip plane or failure plane.
- Shear strength is a term used in soil mechanics to describe the magnitude of the shear stress that a soil can sustain. The shear resistance of soil is a result of friction and interlocking of particles, and possibly cementation or bonding at particle contacts.
- Soil friction angle is a shear strength parameter of soils. Its definition is derived from the Mohr-



Coulomb failure criterion and it is used to describe the friction shear resistance of soils together with the normal effective stress.

- Drained condition occurs when there is no change in pore water pressure due to external loading. UnDrained condition occurs when the pore water is unable to drain out of the soil.
- In an undrained condition, the rate of loading is much quicker than the rate at which the pore water is able to drain out of the soil.
- Slope stability is the process of calculating and assessing how much stress a particular slope can manage before failing.
- Slopes which are formed naturally and which exist in hilly areas are natural slopes The sides of cuttings.
- The slopes of embankments constructed for roads railway lines, canals etc. The slopes of earth dams constructed for storing water are few man made slopes.
- The term infinite slope is used to designate a constant slope of infinite extent. The long slope of the face of a mountain It is the ratio of Resisting forces by Driving forces

SHORT ANSWER QUESTIONS [2M]

1. What is Active Earth Pressure? [OCT/NOV2015]
2. What is Passive Earth Pressure? NOV/DEC 2016
3. What is At rest Earth Pressure?
4. Write the assumptions of Rankine's Theory? NOV/DEC 2016
5. Write the assumptions of Coulombs Theory.
6. Distinguish between active and passive earth pressures.
7. Write short notes on Culmann's graphical method.
8. What is Rankine's passive earth pressure coefficient?
9. What is Rankine's active earth pressure coefficient? NOV/DEC 2016
10. What is lateral earth pressure? [OCT/NOV2015]
11. Where do we use earth pressure theories?
12. What are different modes of failure for retaining wall?
13. Define gravity retaining walls? [OCT/NOV2015]
14. What is the Factor of Safety against Sliding for retaining wall?
15. What is the factor of safety against overturning for retaining wall?
16. What are various types of retaining walls?
17. What is Cantilever retaining wall?
18. Describe Counter fort retaining wall? [OCT/NOV2015]

LONG ANSWER QUESTIONS [5M]

1. Describe briefly Rankine's earth pressure theory? [OCT/NOV2015]
2. Describe briefly Coulombs earth pressure theory.
3. Distinguish the Rankine's and Coulomb's theories for computation of earth pressure and suggest the suitability of these methods.
4. Explain briefly Culmann's Graphical Method? [OCT/NOV2015]
5. What is the effect of submergence on active and passive earth pressures?
6. Derive the expression for coefficient of Active and passive earth pressure coefficients according to coulombs earth pressure theory?
7. Explain in detail various types of Retaining Walls? [OCT/NOV2015]
8. Explain in detail the design of gravity retaining wall.
9. Explain in detail various stability conditions that should be checked for the retaining wall? NOV/DEC 2016
10. Explain with neat diagram stability of retaining against sliding? [OCT/NOV2015]
11. A gravity retaining wall of height 3 m with uniform thickness (i.e. rectangular in cross section) of 1.20m is constructed in RRM with a unit weight of 24 kN/m^3 . The



average properties of soil from top to bottom of wall includes $c = 0\text{kN/m}^2$; $\phi = 30^\circ$. Analyze the stability of wall against overturning when the entire backfill is Moist with a unit weight of 18 kN/m Submerged(consider the saturated unit weight in submerged conditions as 9.80kN/m^3)

CHOOSE THE CORRECT ANSWER

1. The Mohr's theory of failure can be symbolically expressed as _____
 - a) $\tau_{\max} = F(\sigma_n)$ and $\sigma_{\max} - \sigma_{\min} = f(\sigma_{\max} + \sigma_{\min})$
 - b) $\tau_{\max} = \sigma_{\max} - \sigma_{\min}$
 - c) None of the mentioned
 - d) All of the mentioned
2. The concept of a three dimension yield envelope was presented by _____
 - a) **D.C. Drucker and Prager**
 - b) Mohr
 - c) None of the mentioned
 - d) All of the mentioned
3. A major drawback of Mohr criterion is _____
 - a) **Shape of the envelope**
 - b) Principal stress
 - c) Shape of the plane
 - d) All of the mentioned
4. The yield or failure criterion can be expressed as _____
 - a) $f(I_1, I_2) = 0$
 - b) **$f(I_1, I_2, I_3) = 0$**
 - c) $f(\sigma_1, \sigma_2, \sigma_3) = 0$
 - d) $f(\sigma_{\max} + \sigma_{\min})$
5. If the auxiliary plane in hydrostatic axis passes through the origin, then its equation is _____
 - a) **$\sigma_1 + \sigma_2 + \sigma_3 = 0$**
 - b) $\sigma_1 + \sigma_2 + \sigma_3 = \text{constant}$
 - c) $I_1 + I_2 + I_3 = 0$
 - d) $f(\sigma_1, \sigma_2, \sigma_3) = 0$
6. The intersection of the yield surface or envelope with octahedral plane is called _____
 - a) Yield point
 - b) Deviation point
 - c) **Failure locus**
 - d) Space diagonal
7. The hydrostatic pressure's inability to produce failure under normal pressure was first demonstrated by _____
 - a) **Cross land**
 - b) W. Pager
 - c) D.C. Drucker



- d) Mohr
8. Which of the following equation represent hydrostatic pressure in its purest form?
- $\sigma_1 + \sigma_2 + \sigma_3 = 0$
 - $\sigma_1 + \sigma_2 + \sigma_3 = \text{constant}$**
 - $\sigma_1 = \sigma_2 = \sigma_3$
 - $\sigma_{\max} + \sigma_{\min}$
9. The Mohr-Coulomb criterion assumes that the strength of the soil is independent of _____
- σ_1**
 - σ_2
 - σ_3
 - All of the mentioned
10. The auxiliary plane in the hydrostatic axis can also be called as _____
- Failure plane
 - Octahedral plane
 - Deviatoric plane**
 - Principal plane

Unit-IV: (SHALLOW FOUNDATIONS)

Important points / Definitions:

- Foundation which is placed near the surface of the earth or transfers the loads at shallow depth is called
- shallow foundation. Foundation which is placed at a greater depth or transfers the loads to deep strata is called deep foundation.
- Shallow foundation. Individual footing or isolated footing. Combined footing. Strip foundation. Raft or mat foundation. Deep Foundation. Pile foundation. Drilled Shafts or caissons.
- A pile cap is a thick concrete mat that rests on concrete or timber piles that have been driven into soft or unstable ground to provide a suitable stable foundation.
- Capacity of pile group is the sum of the individual capacities of piles, but it is influenced by the spacing between the piles.
- The ultimate bearing capacity of a pile is the maximum load which it can carry without failure or excessive settlement of the ground.
- Negative skin friction occurs when concrete piles are situated in soft soils, consolidating soil-mass.
- The minimum depth of footing in sloping ground with the rock, the horizontal distance shall be at least 600 mm or 2 feet from the lower edge of the footing.
- When a pile is driven into soil of fairly uniform consistency and the tip is not seated in a hard layer, the load-carrying capacity of the pile is developed by skin friction. The load is transferred to the adjoining soil by friction between the pile and the



surrounding soil.

- The load per unit area of the foundation at which shear failure in soil occurs is called ultimate bearing capacity

SHORT ANSWER QUESTIONS [2M]

1. What is bearing capacity? [OCT/NOV 2016]
2. What is difference between ultimate bearing capacity and Safe bearing capacity?
3. What is net safe bearing capacity? [OCT/NOV2015]
4. Write Terzaghi ultimate bearing capacity equation for continuous footing? [OCT/NOV 2016]
5. Write Terzaghi ultimate bearing capacity equation for square footing.
6. What is settlement of footing as per plate load test?
7. What are the various types of settlements in foundations? [OCT/NOV 2016]
8. Define foundation? [OCT/NOV2015]
9. Write Terzaghi ultimate bearing capacity equation for rectangular footing.
10. Define end bearing pile? [OCT/NOV 2016]

LONG ANSWER QUESTIONS [5M]

1. Explain in detail Terzaghi's Bearing Capacity Theory? [OCT/NOV 2016]
2. Discuss in detail various types of bearing capacities? [OCT/NOV 2016]
3. Explain in detail Meyerhof Bearing Capacity Theory? [OCT/NOV 2016]
4. Write in detail about Indian Standard Bearing Capacity equation? [NOV/DEC 2017]
5. Explain in detail plate load test. [NOV/DEC 2017]
6. What is the Safe bearing pressure based on N value?
7. Explain the Dynamic formulae for Estimating the load carrying? [OCT/NOV 2016]
8. Explain the Static method for Estimating the load carrying capacity of a single pile driven in cohesive soil? [OCT/NOV2015]
9. Design a strip footing for load bearing wall transmitting a force of 200kN/m proposed to be laid at a depth of 1.50 m below the G.L on a c-φ soil with c=40 kPa and φ=20°, γ=17kN/m³. Given N_c=11.80, N_q=3.90, N_γ=1.70. [NOV/DEC 2017]
10. Determine the ultimate bearing capacity of a strip footing, 1.5 m wide, with its base at a depth of 1m, resting on a dry sand stratum take γ_d=17kN/m³, c'= 0 kPa and φ=38°. Use Terzaghi theory[NOV/DEC 2017]
11. Determine the ultimate bearing capacity of a footing, 1.5 m wide, with its base at a depth of 1m, resting on a dry sand stratum take γ_d=17kN/m³, c'= 0 kPa and φ=38°. Use bearing capacity factors recommended by Meyerhof. Ignore Embedment effect[OCT/NOV2015]
12. Calculate net ultimate bearing capacity of a rectangular footing 2m X 4m in plan, founded at a depth 1.5 m below GL. The load on the footing is 200 kN/m². γ_{sat}= 18 kN/m³ c'= 15 kPa and φ=25°. GWT is at 2m below GL. Use Terzaghi's theory. [OCT/NOV 2016]

CHOOSE THE CORRECT ANSWER

1. IS code recommends a bearing capacity equation, which is similar to _____
a) Vesic



- b) **Meyerhof and Brinch Hansen**
c) None of the mentioned
d) All of the mentioned
2. According to IS code, there are _____ types of failures of soil support beneath the foundation.
a) 2
b) 4
c) **3**
d) 5
3. The bearing capacity equation for strip footing as given IS standard, can be modified on the basis of _____
a) **Shape of the footing**
b) Type of soil
c) Bearing capacity
d) All of the mentioned
4. The value of shape factor S_c , S_q and S_γ for circular base is _____
a) 1.3, 1.2, 0.8
b) **1.3, 1.2, 0.6**
c) 1.0, 1.0, 1.0
d) 1.2, 1.0 and 1.3
5. The depth factor can be applied to footing only when _____
a) **Back filling is compacted**
b) Shape factors are not used
c) The base of the footing is circular
d) All of the mentioned
6. The effect of the water table is taken into account for bearing capacity in the form of _____
a) Depth factor
b) Inclination factor
c) **Correction factor**
d) Shape factor
7. If the water table is located at the depth D , then the value of W' is taken as _____
a) 1
b) **0.5**
c) 2
d) 0
8. For cohesion less soils, having $c=0$ Indian standard code recommends that the bearing capacity can be calculated based on _____
a) Relative density
b) Standard penetration resistance value



- c) Static cone penetration
- d) **All of the mentioned**

9. The standard penetration resistance is determined at a number of selected points at intervals of _____
- a) 80 cm
 - b) 75 cm**
 - c) 100 cm
 - d) 10 cm

10. The ultimate bearing capacity for cohesive soil can be calculated using the equation

- a) $q_{nf} = c N_c.sc$
- b) $q_{nf} = c N_c.sc.dc.ic$
- c) $q_{nf} = N_c.sc.dc$
- d) $q_{nf} = sc.dc.ic$**

Unit-V: (PILE FOUNDATIONS AND WELL FOUNDATIONS)

Important points / Definitions:

- Materials generally used for construction are reinforced concrete, brick or stone masonry
- The well need to embedded or sunk below the maximum scour level to a required depth in order that the resistance from the sides of well is able to withstand the lateral forces acting on the well.
- It is the wedge shaped RCC ring beam located at the lower portion of the well Steining provided to facilitate sinking.
- A protective structure around the top rims of a well to prevent objects from falling into it Sinking of well Foundation can be prevented by the formation of hump inside the dredge hole or wells.
- Well foundation is a type of deep foundation which is generally provided below the water level for bridges.
- Basic Elements of A Well Foundation Well-cap, Steining, Well curb, Bottom plug, Top plug and Intermediate plug. Round Wells, rectangular or square wells.
- In geotechnical engineering a caisson is a watertight retaining structure used, for example, to work on the foundations of a bridge pier for the construction of a concrete dam, or for the repair of ship
- A caisson foundation also called as pier foundation is a watertight retaining structure used as a bridge
- Deep foundation means a foundation unit that provides support for a building by transferring loads either by end-bearing to a soil or rock at considerable depth below the building or by adhesion or friction, or
- both, in the soil or rock in which it is placed. Piles are the most common type of deep foundation

SHORT ANSWER QUESTIONS [2M]

1. What is open caisson? [OCT/NOV 2017]
2. What is Pneumatic caisson?



3. What are the forces acting on well foundation? [OCT/NOV 2017]
4. Write the equation for allowable bearing pressure for well in cohesion less soil.
5. Define scouring? [MAY/JUN 2016]
6. What is well cap? [MAY/JUN 2016]
7. What is Cutting Edge? [OCT/NOV 2017]
8. Name various Components of Well.
9. Write a note on floating caisson foundation. [OCT/NOV 2016]
10. How well foundations are classified? [MAY/JUN 2016]
11. Explain the process of well sinking.
12. What are the forces acting on well foundation? [OCT/NOV 2016]
13. Explain the design criteria for well curb.
14. How skin friction effects the well sinking?
15. Discuss the various types of shapes of well foundations.
16. What is the procedure for sinking of pneumatic caisson? [OCT/NOV 2016]

LONG ANSWER QUESTIONS[5M]

1. Describe various types of caisson foundations and comment on their ability.
2. Explain in detail the procedure of sinking of well foundations.[OCT/NOV 2016]
3. Describe the component parts of a Pneumatic Caisson with a neat sketch. [OCT/NOV 2016]
4. What is a Floating Caisson? How is its stability checked? What are the merits and demerits of a Floating Caisson when compared with other types? [OCT/NOV 2016]
5. Discuss the various kinds of forces likely to act on a well foundation.
6. Discuss the different shapes of Cross-sections of wells used in practice, giving the merits and demerits of each? [NOV/DEC2017]
7. Sketch and describe the various components of a well foundation, indicating the function of each. [OCT/NOV 2016]
8. What are the advantages and disadvantages of a Pneumatic Caisson when compared with other types?
9. Explain the various kinds of forces likely to act on a well foundation? [NOV/DEC2017]
10. What are Tilts and Shifts? What are the remedial measures to control these?

CHOOSE THE CORRECT ANSWER

1. The essential feature of a pneumatic caissons are _____
 - a) **Tilting can be avoided and Removing water by Compressed air**
 - b) Skin fraction is zero
 - c) None of the mentioned
 - d) All of the mentioned
2. The method of construction of pneumatic caisson is similar to _____
 - a) Box caissons
 - b) **Open caissons**
 - c) Rectangular caissons
 - d) All of the mentioned
3. The working chamber of pneumatic caissons are kept airtight because _____
 - a) To avoid tilting
 - b) To remove the soil



- c) **To prevent water from entering the chamber**
d) None of the mentioned
4. The allowable pressure that is allowed inside the working chamber of pneumatic caissons is _____
a) 2 kg/cm²
b) 4 kg/cm²
c) **3.5 kg/cm²**
d) 7 kg/cm²
5. Advantage of using pneumatic caissons are _____
a) **Affords easy inspection and Process is done under control conditions**
b) Sinking process is easy
c) None of the mentioned
d) All of the mentioned
6. Disadvantage of using pneumatic caissons are _____
a) Process cannot be done under control conditions
b) **Sinking process is tedious**
c) Inspection process is time consuming
d) All of the mentioned
7. In order to prevent leakage of air in the working chamber _____ is provided.
a) **Arrangement of double gates**
b) Air compressor
c) Air lock
d) All of the mentioned
8. The limiting head of water value in pneumatic caisson is _____
a) 40 m
b) 25 m
c) **35 m**
d) 50 m
9. In order to assist sinking of well _____ method is used in pneumatic caissons.
a) **Air pressure is reduced and Using explosive**
b) Using airlocks
c) None of the mentioned
d) All of the mentioned
10. Pneumatic caissons are closed at _____ during construction.
a) Bottom
b) **Top**
c) Top and bottom
d) None of the mentioned



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