

PARUL UNIVERSITY
FACULTY OF AGRICULTURE

B.Tech (Agriculture Engineering) Winter 2019 - 20 Examination

Semester: 3

Date: 06/12/2019

Subject Code: 20103210

Time: 10:30am to 12:30pm

Subject Name: Soil Mechanics

Total Marks: 50

Instructions

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Do as Directed.**A. Fill in the blanks. (Each of 0.5 mark)****(05)**

1. _____ and _____ are known as shear strength parameters of soil.
2. _____ is an example of coarse grained soil.
3. _____ is present in the voids of the soil when it is fully saturated.
4. _____ method of soil classification is used in India for soil classification.
5. _____ is a laboratory method to find shear strength of soil.
6. The value of cohesion for a sandy soil is _____.
7. The temperature of oven for drying the soil is _____ degree Celsius.
8. For a soil having void ratio equal to 1, its porosity will be _____.
9. In standard proctor test, soil is compacted in _____ number of layers.

B. Multiple choice type questions. (Each of 0.5 mark)**(10)**

- 1 **soil particle having size less than 2 micron is _____**
 - a) gravel
 - b) clay
 - c) sand
 - d) silt
2. **Symbol of sand is ____?**
 - a) C
 - b)M
 - c)S
 - d)G
- 3 **which of these method is used to determine density of soil?**
 - a) Core Cutter method
 - b) alcohol method
 - c) oven drying method
 - d) all of these
- 4 **Maximum particle size of sand is : _____**
 - a)0.0075 mm
 - b)2 mm
 - c) 4.75 mm
 - d)0.425 mm
- 5 **For fully dry soil , degree of saturation is _____ .**
 - a) 0
 - b)0.5
 - c)1
 - d)1.5
- 6 **soil transported by water and deposited in lakes is called _____ soil.**
 - a) drift
 - b)alluvial
 - c)tallus
 - d) lacustrine
- 7 **coefficient of curvature is equal to _____**
 - a)D30/D60
 - b)D30²/D10D60
 - c)D60/D30
 - d) D30/D10
- 8 **unit of specific gravity is _____**
 - a) metre
 - b) unitless
 - c) Kilogram
 - d) Seconds
- 9 **Quick sand condition occurs in which type of soil?**
 - a) loose sand
 - b) Dense sand
 - c) stiff clay
 - d) none of the above

10 The minimum water content at which the soil retains its liquid state and also possesses a small shearing strength against flowing, is known

- a) liquid limit
- b) shrinkage limit
- c) plastic limit
- d) permeability limit

11 The quantity of seepage of water through soils is proportional to

- a) coefficient of permeability
- b) total head loss through the soil
- c) neither a) and b)
- d) both a) and b)

12 The minimum water content at which the soil just begins to crumble when rolled into threads 3 mm in diameter, is known

- a) liquid limit
- b) shrinkage limit
- c) plastic limit
- d) permeability limit

13 The coefficient of uniformity is defined

- a) D_{60}/D_{10}
- b) D_{60}/D_{30}
- c) D_{30}/D_{10}
- d) $(D_{30})^2/(D_{60} \times D_{10})$

14 Degree of saturation of a natural soil deposit having water content 10%, specific gravity 2.65 and void ratio 0.75, is

- a) 50%
- b) 35%
- c) 40%
- d) 55%

15 Geologic cycle for the formation of soil, is

- a) Upheaval → transportation → deposition → weathering
- b) Transportation → upheaval → weathering → deposition
- c) Weathering → upheaval → transportation → deposition
- d) Weathering → transportation → deposition → upheaval

16 The effective size of particles of soil is denoted by

- a) D_{30}
- b) D_{10}
- c) D_{60}
- d) D_{90}

17 accurate measurement of shear strength is made by

- a) UCS test
- b) triaxial test
- c) direct shear test
- d) vane shear test

18 The moisture content of the soil sample is given by _____

- a) $m_2 - m_1 / m_3 - m_2$
- b) $m_1 - m_2 / m_3 - m_2$
- c) $m_3 - m_2 / m_3 - m_1$
- d) $m_2 - m_3 / m_3 - m_1$

19 The liquid limit and plastic limit exist in

- a) clay
- b) sand
- c) silt
- d) gravel

20 A soil has bulk density 2.50 g/cm^3 and water content 10 per cent, the dry density of the sample, is

- a) 1 g/cm^3
- b) 2.4 g/cm^3
- c) 2.3 g/cm^3
- d) 2.5 g/cm^3

Q.2 Do as Directed.

A. Define the following. (Any five out of seven)

(05)

1. Define alluvial soil.
2. Define water content.
3. Define aeolian soil.
4. Define void ratio.
5. Define specific gravity.
6. Define permeability of soil.
7. Define Compaction of soil.

B. Answer the following. (Any five out of seven)

(05)

1. Give equation to determine relation between porosity and void ratio.
2. Write full form of OMC and MDD.
3. Give relation between void ratio, degree of saturation, water content and specific gravity of soil.

4. Give example of fine grained soil.
5. Draw two phase diagram for fully saturated soil.
6. List down the apparatus used for standard proctor test.
7. What do you mean by bulk density of soil..

Q.3 Write short notes. (Any five out of six)

(10)

1. Describe the procedure of liquid limit test in short.
2. For a point load of 20 kN acting at the ground level, compute the vertical stresses developed on a horizontal plane located at 4 m depth. Use Boussinesq's theory.
3. Differentiate between coarse grained soil and fine-grained soil.
4. A soil has a porosity of 40%. The specific gravity of soil is 2.70.
Calculate (a) voids ratio (b) dry density of soil.
5. Calculate total stress, effective stress and pore water pressure for a soil bed at 10 m depth and water table is located at the ground level. ($\gamma=20\text{kN/m}^3$)
6. Explain three phase diagram of soil with neat sketch.

Q.4 Long Questions/Example (Attempt any three out of four)

(15)

1. Describe any one method of soil classification in brief.
2. Write short note on Mohr coloumb strength theory
3. Explain triaxial test in detail.
4. What were the assumptions made in boussinesq theory.