Code No: RT31011 **R13** SET - 1

III B. Tech I Semester Regular Examinations, November- 2015
GEOTECHNICAL ENGINEERING – I
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
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PART –A

1 a) Explain different types of soil structures with neat figures. [3M]
b) What is a flow curve? Explain with a neat sketch. [4M]
c) What are the factors affecting permeability? [4M]
d) What are differences between Bossiness's and Westergaard's theories? [4M]
e) Define over consolidated, under consolidated and normally consolidated clays. [3M]
f) Explain the basic mechanism of shear strength of soils. [4M]

PART -B

2 a) What is compaction and how it is different from consolidation? [4M]
b) Explain in detail about three clay minerals. [8M]
c) One cubic metre of wet soil weighs 19.80 kN. If the specific gravity of soil particles is 2.70 and water content is 11%, find the void ratio, dry density and degree of saturation. [4M]

3 a) Define three consistency limits. [3M]
b) Explain IS soil classification. [8M]
c) What are the different hydrometer corrections? Explain. [5M]

4 a) Derive expression for calculating average permeability of layered soil systems. [8M]
b) What are the uses of flow nets? [4M]
c) In order to compute the seepage loss through the foundation of a cofferdam, flownets were constructed. The result of the flownet study gave Nf= 6, Nd = 16. The head of water lost during seepage was 19.68m. If the hydraulic conductivity of the soil is k = 13.12 x 10^{-5} m/s, compute the seepage loss per metre length of dam per day. [4M]

5 a) Explain Newmark's influence chart preparation and usage. [8M]
b) Explain 2:1 stress distribution method. [3M]
c) A ring footing of external diameter 8 m and internal diameter 4 m rests at a depth 2 m below the ground surface. It carries a load intensity 150 kN/m^2. Find the vertical stress at depths of 2, 4 and 8 m along the axis of the footing below the footing base. Neglect the effect of the excavation on the stress. [5M]

6 a) Explain concept of consolidation using Spring Analogy. [5M]

b) Explain the procedure for determining pre consolidated pressure. [5M]

c) An oedometer test is performed on a 2 cm thick clay sample. After 5 minutes, 50% consolidation is reached. After how long time would the same degree of consolidation is achieved in the field where the clay layer is 3.70 m thick? Assume the sample and the clay layers have the same drainage boundary conditions (double drainage). [6M]

7 a) Explain Mohr Coulomb's shear failure theory. [4M]

b) Explain three drainage conditions for conducting shear testing of soils. [4M]

c) Given the following data from a consolidated undrained test with pore water pressure measurement, determine the total and effective stress parameters: [8M]

$\sigma 3$	100 kN/m^2	200 kN/m^2
$(\sigma 1 - \sigma 3)$	150 kN/m^2	192 kN/m^2
uf	60 kN/m^2	140 kN/m^2.

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Code No: RT31011 **R13** SET - 2

III B. Tech I Semester Regular Examinations, November- 2015
GEOTECHNICAL ENGINEERING – I
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
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PART –A

1	a)	What are the effects of compaction on soil properties?	[3M]
	b)	Explain with neat figure about plasticity chart and label it clearly.	[4M]
	c)	What quick sand condition?	[4M]
	d)	What is the use of New mark's influence chart?	[3M]
	e)	Define initial, primary and secondary consolidation of soils.	[4M]
	f)	How soils attain their shear strength?	[4M]

PART -B

2	a)	What is compactive effort?	[4M]
	b)	Write a relationship between void ratio, degree of saturation, unit weight of soil, unit weight of water and specific gravity of soil solids.	[6M]
	c)	The soil in a borrow pit has a void ratio of 0.90. A fill-in-place volume of 20,000 m^3 is to be constructed with an in-place dry density 18.84 kN/m^3. If the owner of borrow area is to be compensated at Rs. 1.50 per cubic metre of the excavation, determine the cost of compensation.	[6M]
3	a)	Draw a grain size distribution curves for different grades of soils and name them.	[6M]
	b)	What are the different Atterberg limts? Explain them.	[6M]
	c)	The natural moisture content of an excavated soil is 32%. Its liquid limit is 60% and plastic limit is 27%. Determine the plasticity index of the soil and comment about the nature of the soil.	[4M]
4	a)	Derive an equation, for determining soil permeability using variable head permeability test.	[8M]
	b)	A concrete dam is constructed across a river over a permeable stratum of soil of limited thickness. The water heads are upstream side 16m and 2m on the downstream side. The flow net constructed under the dam gives Nf= 4 and Nd=l2. Calculate the seepage loss through the subsoil if the average value of the hydraulic conductivity is 6 x 10^{-3} cm/sec horizontally and 3 x 10^{-4} cm/ sec vertically. Calculate the exit gradient if the average length of the last field is 0.9 m. Assuming e = 0.56, and Gs = 2.65, determine the critical gradient. Comment on the stability of the river bed on the downstream side.	[8M]

5 a) Derive an equation for determining the stress intensity at a given on the axis of loading due to the uniformly loaded circular area. [8M]

b) What is an isobar? What is a pressure bulb? [3M]

c) A ring footing of external diameter 8 m and internal diameter 4 m rests at a depth 2 m below the ground surface. It carries a load intensity 200 kN/m^2. Find the vertical stress at depths of 2, 4 and 8 m along the axis of the footing below the footing base. Neglect the effect of the excavation on the stress. [5M]

6 a) Explain coefficient of volume compressibility, coefficient of consolidation. [6M]

b) How do you determine the consolidated settlement of a foundation? [4M]

c) An oedometer test is performed on a 4 cm thick clay sample. After 5 minutes, 50% consolidation is reached. After how long a time would the same degree of consolidation is achieved in the field where the clay layer is 8 m thick? Assume the sample and the clay layer has the same drainage boundary conditions (double drainage). [6M]

7 a) Explain the limitations of shear box test. [4M]

b) Name different lab shear tests on soils. [4M]

c) Given the following data from a consolidated undrained test with pore water pressure measurement, determine the total and effective stress parameters: [8M]

$\sigma 3$	100 kN/m^2	200 kN/m^2
$(\sigma 1 - \sigma 3)$	157 kN/m^2	199 kN/m^2
uf	57 kN/m^2	136 kN/m^2.

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Code No: RT31011 **R13** SET - 3

III B. Tech I Semester Regular Examinations, November- 2015
GEOTECHNICAL ENGINEERING – I
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	What is compaction control? Explain.	[4M]
	b)	Explain $C_{U,}$ C_C.	[4M]
	c)	What is Capillarity? Derive an equation to find its rise in soils.	[4M]
	d)	What is the use of New mark's influence chart?	[3M]
	e)	What is degree of consolidation and what is it's relation with time factor?	[3M]
	f)	Explain different drainage conditions for shear testing of soils.	[4M]

PART -B

2	a)	Explain the difference between IS light and heavy compactions.	[6M]
	b)	Write a relationship between water content, void ration, degree of saturation and specific gravity of soil solids.	[4M]
	c)	A dry soil has a void ratio of 0.65 and its grain specific gravity is = 2.80. (i) What is its unit weight? (ii) Water is added to the sample so that its degree of saturation is 60% without any change in void ratio. Determine the water content and unit weight. (iii) The sample is next placed below water. Determine the true unit weight (not considering buoyancy) if the degree of saturation is 95% and 100% respectively.	[6M]
3	a)	Show IS soil classification based on grain size.	[4M]
	b)	Explain Total, neutral and effective stresses.	[6M]
	c)	The laboratory tests on a sample of soil gave the following results: *wn* - 24%, w, = 62%, *wp* = 28%, percentage of particles less than 2 microns is-23%. Determine: (i) The liquidity index, (ii) activity, (iii) consistency and nature of soil.	[6M]
4	a)	Derive an equation for quicksand condition.	[6M]
	b)	Explain Total, Neutral and Effective Stresses.	[6M]
	c)	In order to compute the seepage loss through the foundation of a cofferdam, flownets were constructed. The result of the flownet study gave $N,$= 6, Nd = 16. The head of water lost during seepage was 19.68m. If the hydraulic conductivity of the soil is k = 13.12 x 10^{-5} m/s, compute the seepage loss per metre length of dam per day.	[4M]

5 a) Explain New mark's influence chart preparation and usage. [8M]
b) What is an isobar? What is a pressure bulb? [3M]
c) A ring footing of external diameter 8 m and internal diameter 4 m rests at a depth 2 m below the ground surface. It carries a load intensity 250 kN/m^2. Find the vertical stress at depths of 2, 4 and 8 m along the axis of the footing below the footing base. Neglect the effect of the excavation on the stress. [5M]

6 a) What are the assumptions in Terzaghi's 1-D Consolidation theory? [6M]
b) Explain consolidation concept. [4M]
c) An oedometer test is performed on a 3 cm thick clay sample. After 5 minutes, 50% consolidation is reached. After how long a time would the same degree of consolidation is achieved in the field where the clay layer is 6 m thick? Assume the sample and the clay layers have the same drainage boundary conditions (double drainage). [6M]

7 a) How soils attain their shear strength? [4M]
b) Explain soil strength envelop. [4M]
c) Given the following data from a consolidated undrained test with pore water pressure measurement, determine the total and effective stress parameters: [8M]

$\sigma 3$	99 kN/m^2	201 kN/m^2
$(\sigma 1 - \sigma 3)$	155 kN/m^2	197 kN/m^2
uf	58 kN/m^2	138 kN/m^2.

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Code No: RT31011 **R13** SET - 4

III B. Tech I Semester Regular Examinations, November- 2015
GEOTECHNICAL ENGINEERING – I
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
******

PART –A

1	a)	What are factors that affect compaction?	[4M]
	b)	Explain $C_{U,}$ C_C.	[4M]
	c)	What is quick sand condition?	[3M]
	d)	What is 2:1 stress distribution method?	[4M]
	e)	Define coefficient of consolidation and give its relations with other soil parameters.	[3M]
	f)	Explain different drainage conditions for shear testing of soils.	[4M]

PART -B

2	a)	What are various field compaction methods?	[4M]
	b)	Write a relationship between void ratio, degree of saturation, unit weight of soil, unit weight of water and specific gravity of soil solids.	[6M]
	c)	A soil has bulk density of 20.1 kN/m^3 and water content of 15%. Calculate the water content if the soil partially dries to a density of 19.4 kN/m^3 and the void ratio remains unchanged.	[6M]
3	a)	Draw a grain size distribution curves for different grades of soils and name them.	[5M]
	b)	What are the corrections required in hydrometer analysis?	[5M]
	c)	The laboratory tests on a sample of soil gave the following results: *wn* - 24%, w, = 62%, *wp* = 28%, percentage of particles less than 2 microns is-23%. Determine: (i) The liquidity index, (ii) activity (iii) consistency and nature of soil.	[6M]
4	a)	What is capillarity? Derive an equation to find its rise in soils.	[4M]
	b)	Explain Flow nets, their Characteristics and Uses.	[6M]
	c)	A concrete dam is constructed across a river over a permeable stratum of soil of limited thickness. The water heads are upstream side 16m and 2 m on the downstream side. The flow net constructed under the dam gives Nf= 4 and Nd=l2. Calculate the seepage loss through the subsoil if the average value of the hydraulic conductivity is 6 x 10^{-3} cm/sec horizontally and 3 x 10^{-4} cm/ sec vertically. Calculate the exit gradient if the average length of the last field is 0.9 m. Assuming e = 0.56, and G = 2.65.	[6M]

5 a) Explain Newmark's influence chart. [8M]

b) What is an isobar? What is a pressure bulb? [3M]

c) A ring footing of external diameter 8 m and internal diameter 4 m rests at a depth 2 m below the ground surface. It carries a load intensity 300 kN/m^2. Find the vertical stress at depths of 2, 4 and 8 m along the axis of the footing below the footing base. Neglect the effect of the excavation on the stress. [5M]

6 a) Explain Compression Index and Swelling Index. [6M]

b) How do you determine the consolidation settlement of a foundation [4M]

c) An oedometer test is performed on a 3 cm thick clay sample. After 5 minutes, 50% consolidation is reached. After how long a time would the same degree of consolidation is achieved in the field where the clay layer is 5 m thick? Assume the sample and the clay layers have the same drainage boundary conditions (double drainage). [6M]

7 a) Explain shear box test with neat figure. [8M]

b) Given the following data from a consolidated undrained test with pore water pressure measurement, determine the total and effective stress parameters: [8M]

$\sigma 3$	100 kN/m^2	200 kN/m^2
$(\sigma 1 - \sigma 3)$	156 kN/m^2	198 kN/m^2
uf	58 kN/m^2	138 kN/m^2.

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