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

III B. Tech I Semester Regular/Supplementary Examinations, October/November -2017

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)	Define the functional relationship between e, S, & n_a?	[3M]
	b)	Give a short note on unified soil classification system..	[4M]
	c)	Explain about poiseville's law?	[4M]
	d)	Define stress isobar.	[3M]
	e)	Explain how the consolidation settlement is done by using voids ratio?	[4M]
	f)	Discuss about triaxial shear test.	[4M]

PART -B

2	a)	A soil sample has a porosity of 30% the specific gravity of solids is 2.60. Calculate (a) void ratio, (b) dry density (c) unit weight if the soil is 50% saturated and (d) unit weight if the soil is completely saturated.	[4M]
	b)	Explain various types of field compaction control.	[8M]
	c)	Determine the field density of a natural soil by using core cutter method.	[4M]
3	a)	In order to determine the water content 350 gms of wet sandy sample was placed in a pycnometer the mass of the pycnometer, sand and water full to the top of the conical cap was found to be 2350 gms the mass of the pycnometer full of clean water was 2000 gms. Taking G =2.75, determine the water content of the sample?	[4M]
	b)	Explain the classification of soils by textural classification system.	[8M]
	c)	Write a short note on pipette method.	[4M]
4	a)	Explain how the capillarity and permeability test is conducted. Describe briefly.	[8M]
	b)	Evaluate the flow net construction is done by graphical method.	[8M]
5	a)	Explain how the vertical pressure determined due to strip load?	[8M]
	b)	Derive an expression of vertical stress for normal load aver a circular area.	[8M]
6	a)	Explain the consolidation process by spring analogy.	[8M]
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b) Two clay specimens A and B, of thickness of 2cm and 3cm, have equilibrium voids ratios 0.68 and 0.72 respectively under a pressure of 200kN/m^2. If the equilibrium void ratios of two soils reduced to 0.5 and 0.62 respectively. When the pressure was increased to 400 kN/m^2, find the ratio of the coefficient of permeability of the two specimens. The time required by the specimen A to reach 40 percent degree of consolidation ¼ is of that required by specimen B for reaching 40 percent degree of consolidation? [8M]

7 a) Explain briefly about the Mohr's stress circle. [8M]

b) Find an expression for the unconfined compressive strength q_u in terms of c′, ø′ and A_f (pore pressure parameter at failure). Take parameter B=1 and initial capillary tension = μ_c? [8M]

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

III B. Tech I Semester Regular/Supplementary Examinations, October/November -2017

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)	Define the functional relationship between γ,G, e, S?	[3M]
	b)	Write salient features of plasticity chart.	[4M]
	c)	Explain how determination of seepage pressure is done?	[4M]
	d)	Determine the vertical pressure distribution on horizontal plane.	[3M]
	e)	Define coefficient of volume change.	[4M]
	f)	Discuss about vane shear test.	[4M]

PART -B

2	a)	A soil sample has a porosity of 60% the specific gravity of solids is 2.40. Calculate (a) void ratio, (b) dry density (c) unit weight if the soil is 50% saturated and (d) unit weight if the soil is completely saturated.	[4M]
	b)	Explain briefly about the effect of compaction on soil properties?	[8M]
	c)	Determine the field density of a natural soil by using rubber balloon method?	[4M]
3	a)	In order to determine the water content 385 gm of wet sandy sample was placed in a pycnometer the mass of the pycnometer, sand and water full to the top of the conical cap was found to be 2450 gm the mass of the pycnometer full of clean water was 1870 gm. Taking G =2.55, determine the water content of the sample?	[4M]
	b)	Explain the classification of soils by US classification system?	[8M]
	c)	Write a short note on particle size distribution curve?	[4M]
4	a)	Explain how the preatic line of an earth dam by using casagrande method.	[8M]
	b)	Discuss briefly about falling head permeability test.	[8M]
5	a)	Write a short note on westergaard's analysis.	[8M]
	b)	Derive an expression of vertical stress for triangular, uniformly distributed strip load of finite width and trapezoidal loading.	[8M]
6	a)	Distinguish the consolidation process of undisturbed specimen.	[8M]
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b) Two clay specimens A and B, of thickness of 2.5cm and 3.5cm, have equilibrium voids ratios 0.65 and 0.75 respectively under a pressure of 250kN/m^2. If the equilibrium void ratios of two soils reduced to 0.57 and 0.71 respectively. When the pressure was increased to 450 kN/m^2, find the ratio of the coefficient of permeability of the two specimens. The time required by the specimen A to reach 50 percent degree of consolidation ¼ is of that required by specimen B for reaching 50 percent degree of consolidation? [8M]

7 a) Explain briefly about the Mohr's Coulomb failure theory. [8M]

b) A vane, 10cm long and 8 cm in diameter, was pressed into soft clay at the bottom of a bore hole torque was applied and gradually increased to 45N-m when failure took place. Subsequently, the vane rotated rapidly so as to completely remould the soil. The remoulded soil was sheared at a torque of 18N-m. Calculate the cohesion of the clay in the natural and remoulded state and also the value of the sensitivity? [8M]

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

III B. Tech I Semester Regular/Supplementary Examinations, October/November -2017

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)	Define the functional relationship between e, G, w & S.	[3M]
	b)	Define consistency index and liquidity index.	[4M]
	c)	Explain the relationship between discharge velocity & seepage velocity.	[4M]
	d)	What are the assumptions made by theory of elasticity?	[3M]
	e)	Explain how the consolidation settlement is done by using coefficient of volume change?	[4M]
	f)	Discuss about direct shear test.	[4M]

PART -B

2	a)	A soil sample has a porosity of 40%. The specific gravity of solids is 2.70. Calculate (a) Void ratio (b) dry density (c) unit weight if the soil is completely saturated.	[4M]
	b)	Explain different types of field compaction methods.	[8M]
	c)	Determine the field density of a natural soil by using sand replacement method.	[4M]
3	a)	In order to determine the water content 370 gm of a wet sandy sample was placed in a pycnometer. The mass of the pycnometer, sand and water full to the top of the conical cap was found to be 2148gm.The mass of pycnometer full of clean water was 1932gm taking G=2.65 Determine the water content of the sample.	[4M]
	b)	Explain the classification of soils by IS classification system.	[8M]
	c)	Write a short note on sedimentation analysis.	[4M]
4	a)	What are the factors affecting permeability?	[8M]
	b)	Explain how the preatic line is determined in an earth dam with no filter.?	[8M]
5	a)	Explain how the vertical pressure determined due to line load?	[8M]
	b)	Derive an expression of stress distribution for uniform vertical load over a strip.	[8M]
6	a)	Distinguish the consolidation of laterally confined soil.	[8M]
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b) Two clay specimens A and B, of thickness of 1.8cm and 2.8cm, have equilibrium voids ratios 0.63 and 0.70 respectively under a pressure of 280kN/m^2. If the equilibrium void ratios of two soils reduced to 0.53 and 0.68 respectively. When the pressure was increased to 380 kN/m^2, find the ratio of the coefficient of permeability of the two specimens. The time required by the specimen A to reach 40 percent degree of consolidation ¼ is of that required by specimen B for reaching 40 percent degree of consolidation? [8M]

7 a) Explain briefly about the effective stress principle. [8M]

b) A vane, 12cm long and 6 cm in diameter, was pressed into soft clay at the bottom of a bore hole torque was applied and gradually increased to 50N-m when failure took place. Subsequently, the vane rotated rapidly so as to completely remould the soil. The remoulded soil was sheared at a torque of 25N-m. Calculate the cohesion of the clay in the natural and remoulded state and also the value of the sensitivity? [8M]

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

III B. Tech I Semester Regular/Supplementary Examinations, October/November -2017

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)	Define the functional relationship between γ_d , G, & e.	[3M]
	b)	What do you understand by grain size distribution? Briefly explain.	[3M]
	c)	Explain how to determine exit gradient?	[4M]
	d)	Determine the vertical pressure distribution along a vertical line.	[4M]
	e)	Define coefficient of compressibility.	[4M]
	f)	Discuss about unconfined compression test.	[4M]

PART -B

2	a)	A soil sample has a porosity of 50%. The specific gravity of solids is 2.80. Calculate (a) Void ratio (b) dry density (c) unit weight if the soil is completely saturated.	[4M]
	b)	What are the factors affecting compaction. Explain briefly?	[8M]
	c)	Determine the field density of a natural soil by using water displacement method?	[4M]
3	a)	In order to determine the water content 360 gm of a wet sandy sample was placed in a pycnometer. The mass of the pycnometer, sand & water full to the top of the conical cap was found to be 2250gm.The mass of pycnometer full of clean water was 2031gm, taking G=2.85. Determine the water content of the sample?	[4M]
	b)	Explain the classification of soils by HRB classification system.	[8M]
	c)	Write a short note on Hydrometer method.	[4M]
4	a)	Determine the seepage through Anisotropic soil. Explain briefly.	[8M]
	b)	Explain how the constant head permeability test is conducted?	[8M]
5	a)	Explain about New mark's influence chart?	[8M]
	b)	Derive an expression of vertical stress for triangularly distributed and symmetrically distributed triangular load?	[8M]
6	a)	Explain Terzaghi's theory of one dimensional consolidation.	[8M]
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b) Two clay specimens A and B, of thickness of 3cm and 4cm, have equilibrium voids ratios 0.55 and 0.61 respectively under a pressure of 300kN/m^2. If the equilibrium void ratios of two soils reduced to 0.45 and 0.51 respectively. When the pressure was increased to 500 kN/m^2, find the ratio of the coefficient of permeability of the two specimens. The time required by the specimen A to reach 45 percent degree of consolidation ¼ is of that required by specimen B for reaching 45 percent degree of consolidation? [8M]

7 a) Explain briefly about the skempton's pore pressure. [8M]

b) A vane, 17cm long and 9 cm in diameter, was pressed into soft clay at the bottom of a bore hole torque was applied and gradually increased to 65N-m when failure took place. Subsequently, the vane rotated rapidly so as to completely remould the soil. The remoulded soil was sheared at a torque of 33N-m. Calculate the cohesion of the clay in the natural and remoulded state and also the value of the sensitivity? [8M]

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