Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: CE202

Course Name: STRUCTURAL ANALYSIS – I (CE)

Max. Marks: 100 Duration: 3 Hours

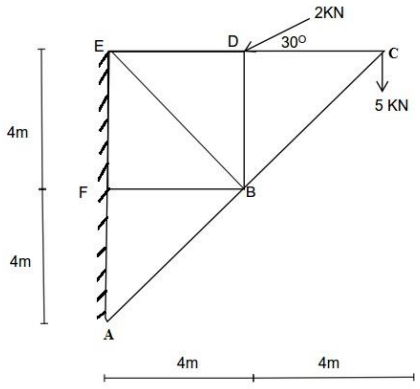
PART A

Answer any two full questions. Each question carries 15 marks.

Answer any two full questions, each carries 15 marks. Marks

1 a) Distinguish between method of joints and method of sections used in the analysis of pin jointed framed structures. 5

b) Analyse the truss shown in figure by method of sections 10



2 a) Derive an expression for strain energy due to bending of a beam subjected to general loading 4

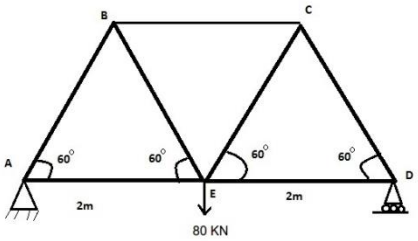
b) Explain Castigliano's theorems with the help of sketches 4

c) State Betti's theorem 4

d) Explain the Principle of least work 3

3 a) Describe static and kinematic indeterminacies with the help of examples 5

b) Determine the vertical displacement of joint E of truss shown in figure by unit load method. Given, for all members cross sectional area = 1000mm^2, Young's modulus = 200 kN/mm^2 10

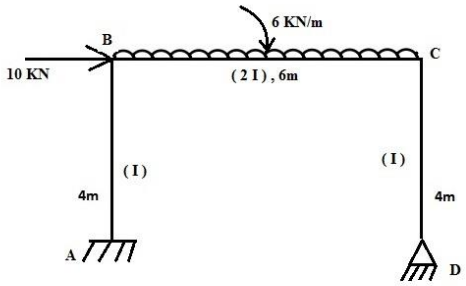


PART B

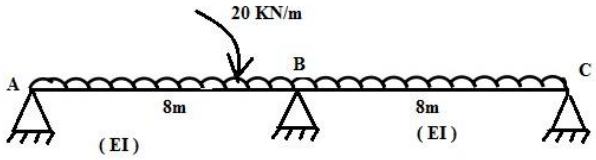
Answer any two full questions, each carries 15 marks.

4 a) Describe the steps involved in the analysis of indeterminate beams subjected to support settlement 5

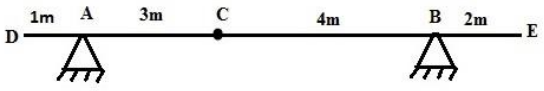
b) Analyse the frame shown in figure using consistent deformation method. Draw the bending moment diagram. 10



5 a) Analyse the beam shown in figure by strain energy method and draw the bending moment diagram. 9



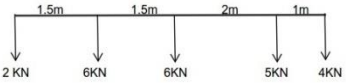
b) Draw the influence lines for shear force and bending moment at a point C of the beam shown in figure 6



6 a) What are influence lines? What are its advantages? 3

b) A train of concentrated loads moves from left to right on a simply supported girder of span 15 m, and 4kN load leading as shown in figure. Determine the 12

maximum shear force and the maximum bending moment at a section 4m from left support.



PART C

Answer any two full questions, each carries 20 marks.

7	a)	With the help of a sketch, explain the various steps involved in the analysis of a loaded cable	8
	b)	A light cable is supported at two points 20m apart which are at the same level. The cable supports three concentrated loads of magnitudes 20 kN, 30 kN and 25 kN at points 1,2 and 3 respectively. The points 1,2 and 3 are at distances 5m, 10m,15 m respectively from the left support. The deflection at first point is found to be 0.8m. Determine the tension in the different segments and total length of the cable.	12
8	a)	Explain with the help of sketches, the different types of arches.	8
	b)	A flexible suspension cable of weight 0.75 N/m hangs between two vertical walls 60m apart, the left hand end being attached to the wall at point 10m below the right hand end. A concentrated load of 100 N is attached to the cable in such a manner that the point of attachment of the load is 20m horizontally from the left hand wall and 5m below the left hand support. Show that the maximum resultant cable tension is at the right hand end and find its value. The cable weight may be taken as uniformly distributed horizontally.	12
9	a)	State Eddy's theorem	5
	b)	A parabolic three hinged arch carries a udl of 30 kN/m on the left half of the span. It has a span of 16 m and a central rise of 3 m. Determine the resultant reactions at the supports. Find the bending moment, normal thrust and radial shear at a section 2m from left support.	15

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER- 2019

Course Code: CE202

Course Name: STRUCTURAL ANALYSIS – I

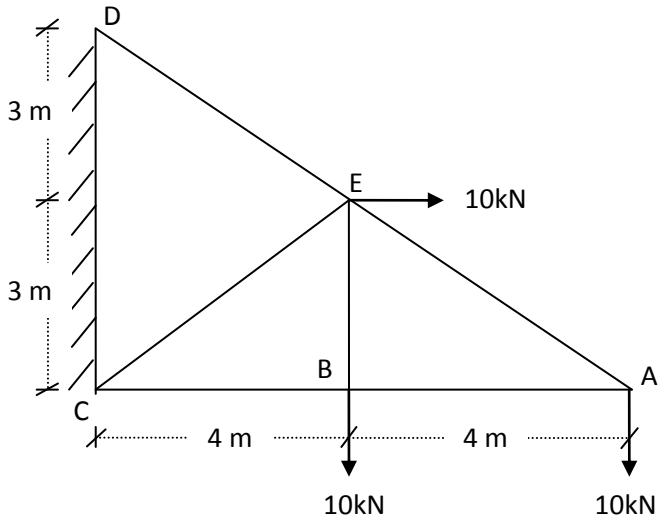
Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions. Each question carries 15 marks.

Answer any two full questions, each carries 15 marks. Marks

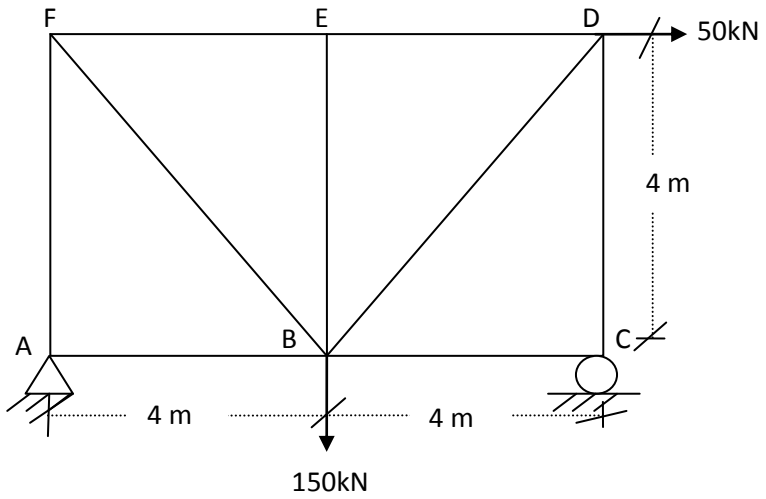
1 a) Analyse the plane truss by method of joints and tabulate the forces in all the members. (12)



b) Explain the 'method of sections' for the analysis of truss. (3)

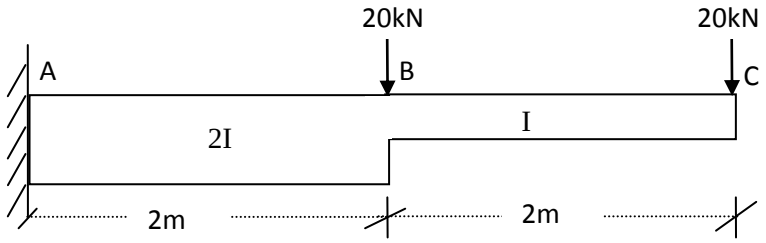
2 a) State Maxwell's law of reciprocal deflections. (3)

b) Determine the vertical deflection at B using unit load method. Cross sectional area of all horizontal members: 50 sq.cm, vertical members and inclined members: 25 sq.cm.E = 200GPa. (12)

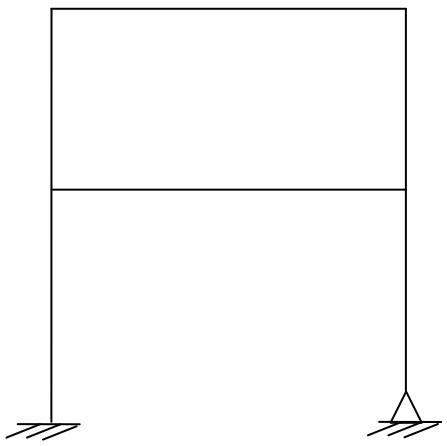


3 a) Derive the expression for strain energy due to bending moment. (3)

b) Determine the deflection at the free end of the cantilever using strain energy method. Given E= 200GPa, I = 6.67 x 10^7mm^4 (10)



c) Determine degree of static and kinematic indeterminacy in the structure shown in fig. Assume all members are axially rigid. (2)

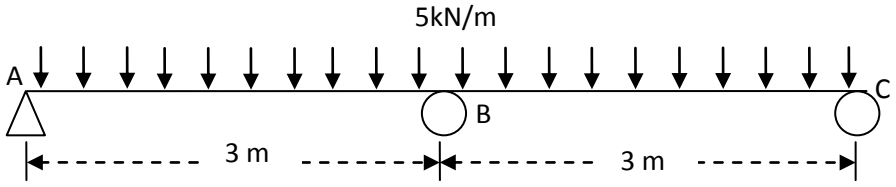


PART B

Answer any two full questions, each carries 15 marks.

4 a) Explain the effect of temperature change in any member of an indeterminate truss. (5)

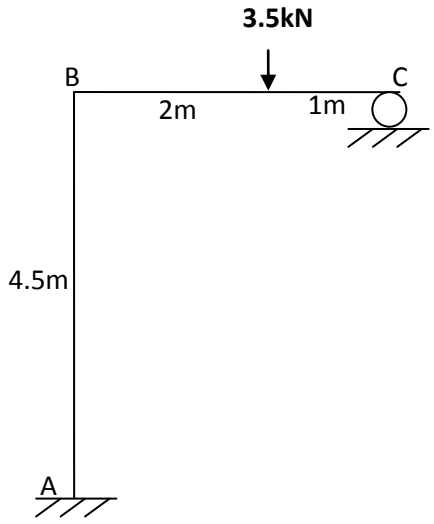
b) Determine the support reactions of the beam shown in fig. using the method of consistent deformation. (10)



5 a) Three wheel loads, each of magnitude W, are traversing a simply supported beam from left to right. If the distance between consecutive wheel loads is *a* and span of the beam is 2*l*, determine the maximum bending moment at mid-span of the beam. Given, *a= l/4* (8)

b) A UDL 2kN/m of length 1.5 m is traversing a simply supported beam of span 8m. Determine i) the maximum support reaction ii) Maximum shear force at a section 2m from left support. In both the cases, indicate the position of the UDL on the span. (7)

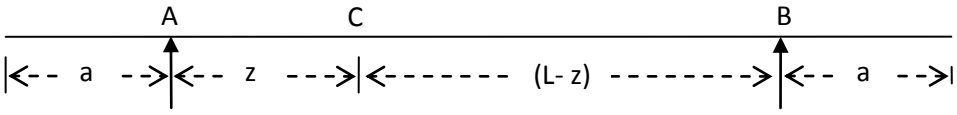
6 a) Analyse the frame shown in figure using strain energy method. (10)



b) For the overhanging beam AB shown in fig., draw influence line diagram for the following : (5)

i)Shear force at C ii) BM at C iii) Support reaction at A iv) Support

reaction at B.



PART C

Answer any two full questions, each carries 20 marks.

7 a) A cable is suspended between two supports 120m apart, at the same level. It carries a UDL of 25kN/m over the entire span. The dip of the cable is 10m. Find i) the length of the cable ii) tension in the cable at the support iii) lowest tension in the cable. (12)

b) Explain the various components of a suspension bridge with the help of a neat figure. (8)

8 a) A 3-hinged parabolic arch has a span of 18m and a rise of 6m. The arch is hinged at the springing A and B and at the crown C. It carries a UDL of 20kN/m over the left half of the span and a point load of 100kN at 4.5m from the right support B. Find the bending moment, normal thrust and radial shear at a section 3m from left end. (15)

b) Draw the influence line diagram for bending moment at any section of a three hinged arch. (5)

9 a) A cable is suspended between two supports 120m apart, at the same level. It carries two concentrated loads each of 5kN at points 30m and 90m from left support. The length of the cable is 160m. Determine i) the support reactions ii) tension in various portions of the cable. (10)

b) A 3-hinged semi-circular arch of radius R carries a UDL of w/ unit run over the whole span. Find i) horizontal thrust at each support ii) location and magnitude of maximum bending moment. (10)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: CE204

Course Name: CONSTRUCTION TECHNOLOGY (CE)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks Marks

1	a)	What are the various types of reinforcing steel? Explain its properties.	9
	b)	What are the properties and uses of aluminium?	6
2	a)	Explain the steps involved in BIS method of concrete mix design.	9
	b)	List the requirements of good building stones.	6
3	a)	What is the role of water in concrete? Explain the significance of testing its quality.	9
	b)	Discuss the role of aggregates in concrete.	6

PART B

Answer any two full questions, each carries 15 marks

4	a)	Explain various types of shallow foundations with neat sketches.	9
	b)	Compare brick and stone masonry.	6
5	a)	What is pointing? Explain its various types with neat sketches.	9
	b)	Enumerate the requirements of partition walls.	6
6	a)	Explain various types of sloped roofs with neat sketches.	9
	b)	List the requirements of an ideal paint.	6

PART C

Answer any two full questions, each carries 20 marks

7	a)	Explain the various types of structural systems with neat sketches.	10
	b)	What is construction joint? Explain its various types with sketches.	10
8	a)	Write a short note on slip form construction. What are its advantages?	10
	b)	What are the various causes of failure in RCC structures? Explain.	10
9	a)	Write a note on failure of structures due to wind and fire.	10
	b)	Explain the various methods of retrofitting columns with sketches.	10

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019

Course Code: CE204

Course Name: CONSTRUCTION TECHNOLOGY

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks Marks

1	a)	How is plywood manufactured? Discuss its classification and uses.	9
	b)	What are the properties and uses of glass?	6
2	a)	Define workability of concrete. What are the factors that affect workability?	9
	b)	Discuss the advantages and disadvantages of steel as a construction material.	6
3	a)	Explain the various tests done on hardened concrete.	9
	b)	Describe briefly the various processes in the manufacturing of concrete.	6

PART B

Answer any two full questions, each carries 15 marks

4	a)	When are pile foundations preferred? Explain various types of piles.	9
	b)	Explain the cavity wall construction with a neat sketch. State its advantages.	6
5	a)	What are the requirements of a good roofing material? Explain the factors to be considered in the selection of a roof material.	9
	b)	What are the advantages of (1) filler slab technology and (2) rat trap bond?	6
6	a)	What are the functions of a lintel? Explain its various types with neat sketches.	9
	b)	Distinguish between plastering and pointing.	6

PART C

Answer any two full questions, each carries 20 marks

7	a)	What are the advantages and disadvantages of RCC and steel framed structures?	10
	b)	List the requirements of a good formwork. Describe various types of formwork.	10
8	a)	What are the processes involved in prefabrication? State the advantages and disadvantages of prefabrication.	10
	b)	What are the various causes of failure in steel structures? Explain.	10
9	a)	Explain the various techniques for achieving earthquake resistance in buildings with neat sketches.	10
	b)	Explain the various methods of retrofitting RCC slab with neat sketches.	10

Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: CE206

Course Name: FLUID MECHANICS II (CE)

Max. Marks: 100 Duration: 3 Hours

Assume any missing data suitably.

PART A

Answer any two full questions, each carries 15 marks. Marks

1 a) Show that the maximum efficiency of a jet striking normally on a series of flat plates arranged over the periphery of a runner is 50 %. (5)

b) A Kaplan turbine develops 15000 kW power at a head of 30 m. The diameter of the boss is 0.35 times the diameter of the runner. Assuming a speed ratio of 2, a flow ratio of 0.65 and an overall efficiency of 90 % calculate the diameter of the runner and the rotational speed. (7)

c) Why the suction lift of a centrifugal pump cannot exceed a certain limit? (3)

2 a) A jet of water having a velocity of 35 m/s impinges without shock on a series of vanes moving at 20 m/s. The jet angle at inlet is 30^0 and jet angle at exit is 60^0. Find: (a) vane angles at entrance and exit (b) work done on vanes per unit weight of water supplied by the jet; and (c) the hydraulic efficiency. (10)

b) A Pelton turbine is to operate under a net head of 500 m at 420 rpm. If a single jet with diameter 18 cm is used, find the specific speed of the machine. Take C_v as 0.98 and overall efficiency as 0.85. (5)

3 a) Derive an expression for the specific speed of a centrifugal pump. (5)

b) A centrifugal pump discharges 0.2 m^3/s of water at a head of 25 m when running at a speed of 1400 rpm. The manometric efficiency is 80%. If the impeller has an outer diameter of 30 cm and width of 5 cm, determine the vane angle at the outlet. (7)

c) Define the term, Net Positive Suction Head. (3)

PART B

Answer any two full questions, each carries 15 marks.

4 a) Define the terms: i) wetted Perimeter, ii) Hydraulic depth and iii) Hydraulic radius. (5)

b) A trapezoidal channel discharging water at the rate of 150 m^3/s is to be designed for most economical section. Find the bottom width of the channel and depth of (10)

water. The side slope is 45^0. Take bed slope is 1 in 1000 and Chezy's constant as 50.

5 a) Derive the condition for maximum discharge for a given value of specific energy. (7)

b) In a hydraulic jump on a horizontal rectangular channel the Froude number before the jump is 10 and energy loss during the jump is 4 m. Find i) depths before and after the jump, ii) the discharge per unit width and iii) Froude no after the jump. (8)

6 a) Define the terms: i) conveyance of a channel section ii) normal depth. (5)

b) A rectangular channel has a width of 1.8 m and carries a discharge of 1.8 m^3/s at a depth of 0.2 m. Calculate i) specific energy ii) depth alternate to the existing depth and iii) Froude numbers at the alternate depths. (10)

PART C

Answer any two full questions, each carries 20 marks.

7 a) Derive the dynamic equation for gradually varied flow, stating the assumptions involved. (8)

b) A trapezoidal channel with 6 m bottom width and side slope 2 horizontal to 1 vertical having a bed slope of 0.0016 carries 10 m^3/s of water. The dam along the way of the channel rises the water depth by 2 m behind the dam. Decide the nature of channel and type of profile of water. Take Manning's coefficient as 0.025 (12)

8 a) The resistance force F of a ship is a function of length L, velocity V, gravitational acceleration g, density ρ and viscosity μ. Develop a functional relationship in terms of non-dimensional numbers using Buckingham π theorem. (10)

b) Explain the different types of similarities to be ensured between the model and prototype. (6)

c) Explain the Froude model law. (4)

9 a) Find the slope of free water surface of a rectangular stream 20 m wide at a section 3 m deep. The slope of the bed of stream is 1 in 5000. Total discharge is 25 m^3/s. Assume Chezy's constant C as 55. State whether water surface will fall or rise. (10)

b) A 1 : 5 scale model of a car is tested in wind tunnel. The velocity of prototype is 75 km/h. The model drag is 300 N. Find out the drag and power required for the prototype. The air used is same in model and prototype. (7)

c) Differentiate between backwater curve and drawdown curve. (3)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019

Course Code: CE206

Course Name: FLUID MECHANICS II

Max. Marks: 100 Duration: 3 Hours

Assume any missing data suitably.

PART A

Answer any two full questions, each carries 15 marks.

			Marks
1	a)	A Pelton wheel working under a head of 800 m develops 15 MW running at 600 rpm with an overall efficiency of 85%. The ratio of wheel diameter to jet diameter is 15, the coefficient of velocity for the nozzle is 0.97 and the speed ratio is 0.46. Determine the rate of flow, diameter of wheel and number of jets.	(8)
	b)	A jet of water having a velocity of 40 m/s strikes a curved vane, which is moving with a velocity of 20 m/s. The jet makes an angle of 30^0 with the direction of motion of vane at inlet and leaves at an angle of 90^0 to the direction of motion of vane at outlet. Determine the vane angles at inlet and outlet so that the water enters and leaves the vane without shock.	(7)
2	a)	A Francis turbine is running at 400 rpm when head available is 60 m. The inner and outer diameters are 50 cm and 100 cm respectively. The constant velocity of flow through the runner is 10 m/s and hydraulic efficiency is 80%. Determine the inlet and outlet runner blade angles.	(8)
	b)	What are the functions of a draft tube?	(4)
	c)	Define specific speed of a centrifugal pump.	(3)
3	a)	Define the terms: i) suction head, ii) delivery head, iii) static head, and iv) manometric head.	(4)
	b)	Why priming is necessary in centrifugal pumps?	(2)
	c)	The impeller of a centrifugal pump has an external diameter of 300 mm and internal diameter of 150 mm and it runs at 1200 rpm. The vanes at exit are set back at an angle of 30°. If the velocity of flow is constant at 2 m/s, determine: i) the blade angle at the inlet, ii) the velocity and direction of water at outlet and iii) the head developed if manometric efficiency is 0.85.	(9)

PART B

Answer any two full questions, each carries 15 marks.

4	a)	Derive Chezy's equation for uniform flow in open channel.	(7)
	b)	It is required to convey 10 m^3/s of water at a mean velocity of 1.25 m/s. Calculate the dimensions of the most efficient section of the channel whose shape is a) rectangular and b) trapezoidal channel of side slope $1/\sqrt{3}$	(8)

5 a) Draw and explain the specific energy curve. (7)

b) In a hydraulic jump occurring in a rectangular horizontal channel the discharge per unit width is 2.5 m^2/s and the depth before the jump is 0.25 m. Estimate the sequent depth and the energy loss. (8)

6 a) Define the terms: i) alternate depths, ii) Normal Slope and iii) Hydraulic mean depth. (5)

b) A rectangular channel 2.5 m wide has a specific energy of 1.50 m when carrying a discharge of 6.48 m^3/s. Calculate the alternate depths and corresponding Froude numbers. (10)

PART C

Answer any two full questions, each carries 20 marks.

7 a) Sketch the water surface profiles that can occur in a mild slope channel. (8)

b) A wide rectangular channel of width 12 m conveys water at a normal depth of 1.8 m, the bed slope being 1 in 1800. Due to an obstruction in the form of an overflow dam the water level near the obstruction rises by 1 m. Find the slope of the water surface near the obstruction with respect to horizontal. Take Manning's coefficient as 0.025. (12)

8 a) State Buckingham π theorem. (3)

b) Explain the different types of similarity that must exist between a prototype and its model. (7)

c) The variables controlling the motion of a floating vessel through water are the drag force F, the speed V, the length L, the density ρ , dynamic viscosity μ of water and acceleration due to gravity g. Derive an expression for drag force F by dimensional analysis. (10)

9 a) A 1: 10 model of a channel is made for the purpose of studying wave motion. Find the scale ratios for (i) velocity, (ii) time and (iii) acceleration. If in the model a wave takes 5 second to travel a distance, find the time taken for the wave in the prototype to describe the corresponding distance. (8)

b) Differentiate between distorted model and undistorted model with examples. (6)

c) State the assumptions made in the derivation of the dynamic equation for gradually varied flow (6)

Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: CE208

Course Name: GEOTECHNICAL ENGINEERING I (CE)

Max. Marks: 100 Duration: 3 Hours

(Graph sheets - ordinary as well as semi-log - may be supplied on request)

PART A

Answer any two full questions, each carries 15 marks Marks

1 a) Void ratio of a soil decreases from 1.15 to 0.85 upon densification. What is the corresponding percentage decrease in volume? 6

b) A soil sample is compacted to a bulk unit weight of 18kN/m^3 at 10% water content. Find the void ratio and degree of saturation of the soil. Also find the weight of water to be added to 100 m^3 of this soil for complete saturation. Assume G=2.75 9

2 a) A clay has a liquid limit of 52% and shrinkage limit of 17%. If a specimen of this soil shrinks from a volume of 10000mm^3 at liquid limit to 6010 mm^3 at shrinkage limit determine the specific gravity of soil grains. 6

b) Draw I.S. Plasticity chart and mark the details. What is its practical application? 9

3 a) Starting from the fundamentals, derive an expression for bulk unit weight in terms of air content, water content and percentage air voids. 8

b) Why is a deflocculating agent correction needed for observed hydrometer reading? What is the nature of correction [positive or negative]? Mention a commonly used deflocculating agent. 7

PART B

Answer any two full questions, each carries 15 marks

4 a) Differentiate between critical hydraulic gradient and exit gradient. 6

b) A sand deposit has: void ratio=0.85; G=2.7. WT is at 1.5m depth below GS and the soil above WT is also fully saturated due to capillarity. Determine the total, neutral and effective stress at 1.2m and 4.2m beneath the GS. 9

5 a) Minor and major principal stresses at failure for a sample of soil subjected to triaxial test are 150kPa and 536.6kPa respectively. Determine the angle of internal friction of this soil, if its cohesion is 25kPa. Also determine (i) the angle made by the failure plane with the horizontal; and (ii) direction of maximum 15

shear stress.

6 a) State any 4 merits of triaxial test over direct shear test. 6

b) A permeameter of 80mm diameter contains a 2-layered soil sample of length 300mm (200mm thick soil having $k=4\times10^{-6}$ mm/sec. underlain by 100mm thick soil with $k=4\times10^{-7}$ mm/sec.) If a falling head permeability test is conducted on this soil with a standpipe of diameter 15mm., what would be the time taken the time taken for the head to fall from 500mm to 100mm? 9

PART C

Answer any two full questions, each carries 20 marks

7 a) The following observations were recorded in a consolidation test on a fully saturated sample. Initial height of sample= 20mm; diameter of sample=60mm; 20

Applied pressure (kPa)	0	25	50	100	200	400	800
Height of soil sample (mm)	20	17.5	17.1	16.5	15	13.5	12.0

Dry weight of soil sample=76.34gms.; G=2.7; Draw e-log p graph and estimate compression index.

8 a) An embankment is constructed at dry density-OMC condition ($20kN/m^3$ and 9%). Borrow area soil has: G=2.5. Determine degree of saturation and percentage air voids of the compacted soil. Also determine the theoretical maximum dry density to which the sample can be compacted. Assume density of water $=10kN/m^3$. 14

b) What is meant by factor of safety with respect to cohesion. When does it become equal to factor of safety with respect to shear strength? 6

9 a) How can the pre-consolidation pressure on clay be estimated? 10

b) What are the forces considered in friction circle method of slope analysis? Suggest any 4 methods for improving the stability of a slope. 10

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019

Course Code: CE208

Course Name: GEOTECHNICAL ENGINEERING I

Max. Marks: 100 Duration: 3 Hours

(Graph sheets may be supplied on request)

PART A

Answer any two full questions, each carries 15 marks Marks

1 a) Define void ratio, porosity, air content and percentage of air voids. 5

b) An embankment having total volume of 2500 m^3 is to be constructed having bulk density of 1.98 gm/cm^3 and placement water content of 18%. The soil is to be obtained from either borrow area A or borrow area B which has void ratio of 0.78 and 0.69 respectively. The water contents of these areas 16% and 12% respectively. If the cost of excavation is Rs. $36/m^3$ from each area. The cost of transportation is Rs.33 and Rs.37 per m^3 from borrow area A and borrow area B respectively. Which area is more economical? Take specific gravity of soils as 2.66. 10

2 a) With the help of particle size distribution graph, define the following (i) Well graded soil (ii) poorly graded soil (iii) gap graded soil 5

b) The wet weight of the soil specimen having size 40 mm diameter and 80 mm height is 1.6N. Its weight after 24 hrs of oven drying is 1.4N. Determine the water content, dry unit weight, bulk unit weight, void ratio and degree of saturation. The specific gravity of soil can be taken as 2.7. 10

3 a) Sketch the plasticity chart used for classifying a fine-grained soil. Classify the soil as per IS classification system 7

Percentage of soil finer than 75-micron sieve = 14%

Percentage of soil finer than 4.75 mm sieve = 63%

Liquid limit = 28%

Plasticity index = 12%

b) An air-dried soil sample weighting 500 gm was sieved in the laboratory. The results are given below. Draw the grain size distribution curve and find the uniformity coefficient, coefficient of curvature, effective size, percentage of gravel and percentage of sand. 8

IS sieve (mm)	4.75	2.0	1.0	0.425	0.212	0.15	0.075	pan
Mass retained (gm)	10	165	100	85	40	30	50	20

PART B

Answer any two full questions, each carries 15 marks

4	a)	Determine the ratio of average coefficient of permeability in the horizontal to vertical direction for a deposit consists of three layers 6m, 1.5m and 3m and having coefficient of permeability $2.5X10^{-2}$ mm/s, $3.5X10^{-5}$ mm/s, $4.5X10^{-2}$ mm/s. Assume the layer to be isotropic.	7
	b)	A direct shear test was conducted on sand gave a failure shear stress of 70 kN/m^2 when the normal stress was 200 kN/m^2. Draw the mohr circle, mohr failure envelope and find the angle of shear resistance. Find the principal stresses at failure and orientation principal planes.	8
5	a)	State and explain Darcy' s law.	4
	b)	In a variable head permeability test the initial head is 50 cm. The head drops by 15cm in 15 minutes. Find the time required to run the test for the final head to become 20 cm. Take the height and cross sectional area of the soil sample as 6 cm and 50 cm^2 respectively. Take the area of stand pipe as 0.5 cm^2.	5
	c)	An unconfined compression test was conducted on clay sample 150 mm diameter and 300 mm height. The failure load was 150N and axial deformation at the time of failure was 3 mm. Find the cohesive strength of the soil.	6
6	a)	Write the merits and demerits of direct shear test	6
	b)	A soil profile consists of surface layer of gravel 4 m thickness having density 17 kN/m^3, an intermediate layer of clay 3.5m thickness having saturated density 18 kN/m^3 and bottom layer of sand 4 m thickness having saturated density of 19 kN/m^3. The water table is at 4m from ground level. Determine the total stress, neutral stress and effective stress at bottom and interface layers.	9

PART C

Answer any two full questions, each carries 20 marks

7	a)	Define normally consolidated soil, over consolidated soil and under consolidated soil.	5
	b)	Write down the weight of hammer, height of fall, number of layers, volume of the mould and number of blows per layer for I.S.Light compaction test.	7.5
	c)	At a site the soil consists of sand up to 3.5m depth and from 3.5m to 7m the soil is normally consolidated clay. The water table is at 1.5m from ground level. The density of sand is 19 kN/m^3 above the water table and 20 kN/m^3 below the water table. The natural water content and specific gravity of clay are 60% and 2.65 respectively. The liquid limit of clay is 75%. Estimate the probable settlement of clay layer, if the pressure at mid-height of clay layer increases by 40kPa.	7.5
8	a)	Explain the method to find the preconsolidation pressure.	6
	b)	Explain the procedure for determination of coefficient of consolidation by logarithm of time fitting method.	6

	c)	An undisturbed sample of clay 20mm thickness consolidated 50% in 25 minutes in the laboratory when drainage allowed at top and bottom. The same clay having thickness 5m exist in the filed with sandy layer at top and bottom of clay. Find the time required to consolidate 50% and 90% in the field.	8
9	a)	Find the factor of safety with respect to cohesion of clay laid at a slope of 1 in 2 for a height of 12m. The angle of friction and cohesive strength are respectively 10^0 and 30 kN/m^2. Take the density of soil as 20 kN/m^3. The stability number for the given condition is 0.064.	5
	b)	Explain Swedish circle method	7
	c)	The maximum dry density of a soil sample obtained from light compaction test is 1.85 g/cc and optimum moisture content is 14%. If the specific gravity of solids is 2.65, determine the degree of saturation of soil at OMC and the dry density corresponding to zero air void condition at OMC.	8

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