Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

THIRD SEMESTER B.TECH DEGREE EXAMINATION(S), May 2019

Course Code: CE201

Course Name: MECHANICS OF SOLIDS

Max. Marks: 100 Duration: 3 Hours

PART A

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

1 a) Define Bulk modulus. Calculate the change in volume of a cubical block of side 120 mm subjected to a hydrostatic pressure of 70 MPa. Take Poisson's ratio 0.28 and young's modulus 200 GPa. (5)

b) A steel rod 2 m long and 3 mm in diameter is extended by 0.75 mm when a weight W is suspended from the wire. If the same weight is suspended from a brass wire, 2.5 m long and 2 mm in diameter, it is elongated by 4.64 mm. Determine the modulus of elasticity of brass if that of steel be 2×10^5 N/mm^2. (10)

2 a) State and explain principle of superposition. (5)

b) Calculate the total deformation of the bar shown in fig.1 What will be the diameter of a bar of uniform cross section, to have the same strain as that of the stepped bar? Take Young's modulus as 200 GPa. (10)

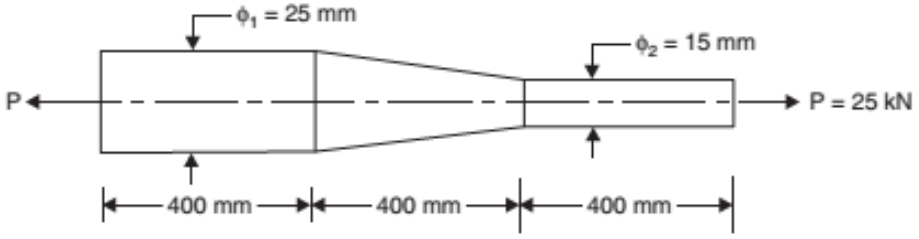

Fig.1

3 a) The composite bar shown in fig.2 is rigidly fixed at the ends A and B. Determine the reaction developed at ends when the temperature is raised by 25^0c. Given E_{cu} =140 kN/mm^2 , E_s =200 kN/mm^2, α_{cu} = $17.5\times10^{-6}/^0C$, α_s = $12\times10^{-6}/^0C$ (10)

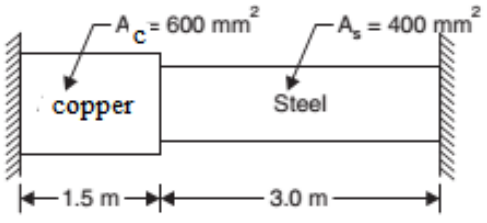

Fig.2

b) Define the terms i) Resilience ii) Proof resilience iii) Modulus of resilience (5)

PART B

Answer any two full questions, each carries 15 marks.

4 a) Explain the following: (5)

i) Shear force and bending moment in a beam.

ii) Hogging and sagging moments.

iii) Point of contra flexure.

b) Determine the load P such that reactions at supports A and B are equal in the beam shown in fig3.Draw the shear force and bending moment diagrams and mark the values at salient points. (10)

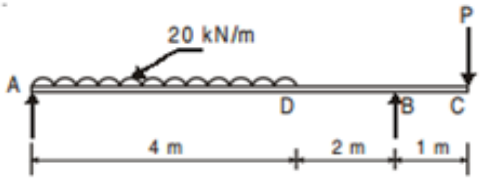

Fig.3

5 a) What is meant by pure bending? Sketch an example of a beam subjected to pure bending. (3)

b) A simply supported beam of length 3 m carries a point load of 12 kN at a distance of 2 m from left support. The cross section of the beam is as shown in Fig.4 b. (12)

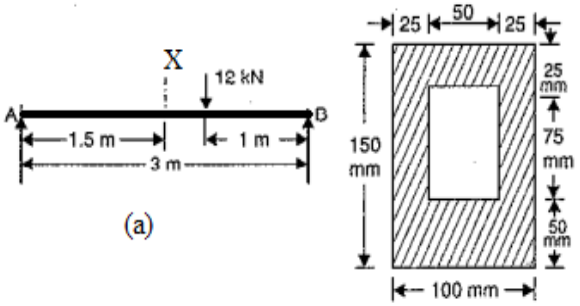

Fig.4

Determine the bending stresses at extreme fibres at section X-X. Take moment of inertia about neutral axis of the section as 2.56×10^7 mm^4.

6 a) Calculate the strain energy stored in a cantilever beam of length 2 m subjected to a point load 10 kN at the free end. Take E = 200 GPa and I= $1.5\times10^7 mm^4$. (5)

b) Calculate the moment of resistance of a composite beam made of wood and steel. The cross section is rectangular,with wood 150 mm wide and 300 mm deep, strengthened by fixing steel plates of 12 mm thickness and 300 mm deepth on either side.If the maximum stress in wood is 8 N/mm^2, what is the corresponding maximum stress attained in steel?.Take E_w=10 GPa and E_s=200 GPa. (10)

PART C

Answer any two full questions, each carries20 marks.

7 a) At a point in a strained material a direct tensile stress of 70 N/mm^2 and a direct compressive stress of 50 N/mm^2 are acting on planes at right angles to each other. If the maximum principal stress is limited to 75 N/mm^2 tensile, determine the shear stress that may be allowed on these planes. Also determine the i) minimum principal stress ii) maximum shear stress and iii) direction of principal planes. (12)

b) A solid shaft of 200 mm diameter has the same cross sectional area as that of a hollow shaft of the same material with inside diameter of 150 mm. Find the ratio of the power transmitted by the two shafts at the same speed. (8)

8 a) A thin cylinder of internal diameter 2 m contains a fluid at an internal pressure of 3 N/mm^2. Determine the maximum thickness of the cylinder if i) the longitudinal stress is not to exceed 30 N/mm^2 and ii) the hoop stress is not to exceed 40 N/mm^2. (6)

b) Write down Mohr's theorems for slope and deflection of beams. (4)

c) A cantilever beam is 2 m long and has a flexural rigidity of 25MN-m^2. It carries a point load of 3 kN at mid length and a u.d.l of 2 kN/m along its entire length. Calculate the deflection and slope at the free end by Macaulay's method. (10)

9 a) What is meant by kern of a section? Sketch the kern of i) circular and ii) square sections. (6)

b) A hollow rectangular cast iron column having outside width and depth 250×500 mm and thickness 20 mm is fixed at one end and hinged at the other end. Length of the column is 8 m. Calculate the safe load that can be applied on the column assuming a factor of safety of 4. Use Rankine's theory. Take α =1/1600 and σ_c =600 N/mm^2.Compare the value by Euler's theory. Take E= 95 kN/mm^2 (14)

Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

THIRD SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019

Course Code: CE201

Course Name: MECHANICS OF SOLIDS

Max. Marks: 100 Duration: 3 Hours

PART A

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

1 a) Differentiate between(i) Normal stress and shear stress (ii) Young's modulus and Rigidity modulus (iii) Poisson's ratio and volumetric strain (3)

b) A steel bar ABCD consists of three sections: AB is of 20 mm diameter and 200 mm long, BC is 25 mm square and 400 mm long and CD is of 12 mm diameter and 200 mm long. The bar is subjected to an axial compressive load which induces a stress of 30 MN/m^2 on the largest cross section. Determine total decrease in length of the bar when the load is applied. Assume E = 210 GPa (8)

c) Find the Poisson's ratio and bulk modulus of a material whose modulus of elasticity is 200 GPa and modulus of rigidity is 80 GPa. A 2 m long rod of 40 mm diameter made with the same material is stretched by 2.5 mm under some axial load. Find the lateral contraction. (4)

2 a) A linearly tapered bar with circular cross section is subjected to an axial load. Derive an expression for the change of length. (5)

b) A brass bar of 25 mm diameter is enclosed in a steel tube of 25 mm internal diameter and 50 mm external diameter. Both of them are 1m long at room temperature and fastened rigidly to each other at the ends. If the room temperature is 20^oC, find to what temperature the assembly should be heated so as to generate a compressive stress of 48.7 MN/m^2 in brass. What is the stress in steel at this temperature? Assume E_s=200 GN/m^2; E_b=100 GN/m^2; α_s=11.6 x $10^{-6}/^oC$; α_b =18.7 ×$10^{-6}/^oC$ (8)

c) Obtain the expressions for strain energy stored in a prismatic bar due to axial load. (2)

3 a) Draw the stress strain curve of mild steel and mark the salient points (6)

b) A vertically suspended bar with collar at lower end has 30 mm diameter. If a tensile load of 7500 N is applied gradually it produces an extension of 0.3 mm. Determine the height from which this load should be dropped to produce a (9)

maximum stress of 95 N/mm^2. Assume E = 200GPa

PART B

Answer any two full questions, each carries 15 marks.

4 a) A simply supported beam of span L carries a clockwise moment M at its centre. Draw the SFD and BMD (4)

b) Draw the shear force and bending moment diagrams for a cantilever beam of span 5 m subjected to a uniformly distributed load of 5 kN/m over a length of 2 m starting from the free end. (7)

c) Draw the shear stress distribution for a triangular cross section and mark the salient values. (4)

5 a) What is section modulus? Express the section modulus of (i) rectangular section (width=b, depth=d) , (ii) circular section (diameter=d) and (iii) Hollow circular section (Internal diameter=d, External diameter=D) . (5)

b) A beam of I section 200 mm wide and 300 mm deep with flange and web thickness 20 mm is used as a simply supported beam over a span of 7 m. The beam carries a distributed load of 5 kN/m over the whole span and a concentrated load of 20 kN at mid span. Determine the maximum bending stress set up and sketch the stress distribution. (10)

6 a) Obtain the relationship between bending moment, shear force and load intensity at any section of a beam. (5)

b) The intensity of loading on simply supported beam of 5 m span increases gradually from 1 kN/m at one end to 2 kN/m at the other end. Find the position and amount of maximum bending moment. Also draw the SFD and BMD. (10)

PART C

Answer any two full questions, each carries20 marks.

7 a) Derive the expression for the stresses on an oblique plane of a rectangular body when the body is subjected simple shear stress. (6)

b) A hollow shaft is of external diameter 70 mm and diameter ratio 0.8. It transmits a power of 2 HP at 25 rpm. If the maximum torque exceeds the average torque by 25%, draw the shear stress distribution across the section of the shaft indicating the values. (8)

c) Calculate minimum wall thickness of a thin cylinder 1 m in diameter if it is to withstand an internal pressure of 2 N/mm^2 and hoop stress not to exceed 40 (6)

N/mm^2. Also find change in diameter. E = 210 GPa; Poisson's ratio = 0.3.

8 a) At point in an elastic material under strain, there are normal stresses of 60 MN/m^2(tensile) and 35 MN/m^2(compressive) respectively at right angles to each other with a shearing stress of 25 MN/m^2. Find the principal stresses and position of principal planes. Find also the maximum shear stress and its plane. (10)

b) State the two theorems of determining beam deflections by moment area method. (4)

c) Determine the ratio of buckling strength of two columns one hollow and other solid, both are made of same material and have equal length, cross sectional area and same end conditions. Internal diameter of hollow column is half the external diameter. (6)

9 a) Differentiate between long column and short column. (5)

b) Derive Rankine's formula for finding the critical load of columns. (5)

c) A cantilever of length 3 m is carrying a UDL of 10 kN/m over a length of 2 m from fixed end. Find the maximum slope and deflection. Assume EI = 4×10^{12} Nmm^2 (10)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

THIRD SEMESTER B.TECH DEGREE EXAMINATION(S), May 2019

Course Code: CE203

Course Name: FLUID MECHANICS - I

Max. Marks: 100 Duration: 3 Hours

PART A

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

1 a) A cylinder contains a fluid at a gauge pressure of 350 kN/m^2. Express the pressure in terms of head of (a) water, (b) mercury. What would be the absolute pressure in the cylinder if the atmospheric pressure is 101.3 kN/m^2? (5)

b) An annular ring cut in a sheet metal has 1.5 m outer diameter and 1.0 m inner diameter. It is inserted vertically in a liquid of relative density 0.90 with its centre 1.75 m below the surface. Calculate the total force on one side of this ring and the location of the centre of pressure. (10)

2 a) A ship 60 m long and 10 m wide displaces 15000 kN of water. A weight of 200 kN is displaced across the deck through a distance of 5 m and the ship is tilted through 4.5^0. The moment of inertia of the ship about the fore - and - aft axis is 80 % of the circumscribing rectangle. The centre of buoyancy is 2 m below the water surface. Determine the metacentric height and the position of the centre of gravity of the ship. Take specific gravity of water as 1.03. (10)

b) Show that the streamlines and equipotential lines form a net of mutually perpendicular lines. (5)

3 a) Differentiate between the Eulerian and Lagrangian methods of representing fluid flow. (3)

b) The stream function for a flow field is represented by $\Psi = 2xy$. Show that the flow exists and is irrotational. (7)

c) Distinguish between: (5)

(i) Steady flow and Unsteady flow.

(ii) Uniform flow and Non uniform flow.

PART B

Answer any two full questions, each carries 15 marks.

4 a) 215 l of gasoline (specific gravity 0.82) flow per second upwards in an inclined (12)

venturimeter fitted to a 300 mm diameter pipe. The venturimeter is inclined at 60^o to the vertical and its 150 mm diameter throat is 1.2 m from the entrance along its length. Pressure gauges inserted at the entrance and throat show pressures of 0.141 N/mm^2 and 0.077 N/mm^2 respectively. Calculate discharge coefficient of the venturimeter. If instead of pressure gauges, the entrance and throat of the venturimeter are connected to the two limbs of a U-tube mercury manometer, determine its reading in mm of differential mercury column

b) Explain how a pitot tube can be used to find out velocity at any point in a pipeline. (3)

5 a) Explain the methods of experimental determination of orifice coefficients (6)

b) The flow in a 2 m wide rectangular channel is measured by a rectangular weir with crest length 1 m and height 0.6 m. Find the discharge in the channel when the head over the weir is 0.3 m. Take C_d as 0.62. Consider end contractions and velocity of approach. (9)

6 a) Derive Euler's equation of motion and then obtain Bernoulli's equation by integrating it along a streamline. What are the assumptions made in deriving the equation? (8)

b) What is an orifice? How are the orifices classified? (5)

c) What is a Cipolletti weir? (2)

PART C

Answer any two full questions, each carries20 marks.

7 a) Derive Dupuit's equation for pipes in series. (5)

b) Oil of viscosity 0.97 poise and relative density 0.9 is flowing in a horizontal circular pipe of diameter 100 mm and of length 10 m. If 100 kg of oil is collected at the outlet of the pipe in 30 s, calculate the difference in pressure at the two ends of the pipe. Also, verify that the flow is laminar. (10)

c) Name the minor and major losses during the flow of liquid through a pipeline. (5)

8 a) The velocity distribution in the boundary layer is given by: $\frac{v}{V} = \frac{y}{\delta}$, where v is the velocity at a distance y from the plate and v = V at y= δ, δ being the boundary layer thickness. Find (i) the displacement thickness, (ii) the momentum thickness and (iii) the energy thickness. (14)

b) Derive the Darcy-Weisbach equation for head loss in pipes due to friction. (6)

9 a) A city water supply main is 1000 m long and delivers a flow of 100 l/s between (10)

two reservoirs with a head difference of 15 m. It is proposed to increase the flow by 30 % by adding another pipe from the upstream reservoir in parallel and joining to the main pipe at a suitable location. Assume all pipes are of same diameter and same friction factor (f=0.02). Determine length of the additional pipe.

b) Discuss the development of boundary layer over a flat plate. (5)

c) Discuss the phenomenon of separation of boundary layer over curved surface. (5)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

THIRD SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019

Course Code: CE203

Course Name: FLUID MECHANICS - I

Max. Marks: 100 Duration: 3 Hours

PART A

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

1 a) The pressure difference between two points A and B in a pipe conveying oil of specific gravity 0.9 is measured by an inverted U-tube and the column connected to B stands 1.2 m higher than that of A. A pressure gauge attached at A reads $9.81*10^5$ N/m^2 , determine the pressure in the pipe at B. (5)

b) A hollow equilateral triangular plate of side 4 m on the outside and 2m in the hollow portion is immersed in water with its plane vertical, with its vertex downwards and base upwards, base being parallel to the free surface at a depth of 1m below the free surface. Determine the hydrostatic pressure force on one side of the plate and the depth of centre of pressure. (7)

c) Define the following terms: (i) Streamline (ii) Path line (iii) Streak line. (3)

2 a) A solid cylinder of diameter 3m has a height of 2 m. Find the metacentric height of the cylinder when it is floating in water with its axis vertical. The specific gravity of the cylinder is 0.6. State whether the body is stable or not. (7)

b) What is a pressure distribution diagram? What are the applications of such diagram? (4)

c) Calculate the velocity at the point (3, 3) for the velocity potential (4)

$$\phi = \frac{\left(y^2 - x^2\right)}{2} + xy + 6$$

3 a) Derive the continuity equation for a three dimensional flow in Cartesian co-ordinates (6)

b) For the velocity potential function $\phi = \frac{3\left(y^2 - x^2\right)}{2}$, determine the corresponding stream function. Also estimate the discharge per unit depth in the *Z* direction passing between the streamlines through the points (1, 3) and (3, 3). (6)

c) Explain Circulation and Vorticity (3)

PART B

Answer any two full questions, each carries 15 marks.

4 a) An orifice meter with orifice diameter 15 cm is inserted in a pipe of 30 cm diameter. The pressure gauges fitted upstream and downstream of the orifice meter give readings of $14.715*10^4$ N/m^2 and $9.81*10^4$ N/m^2 respectively. Find the rate of flow of water through the pipe. Take C_d =0.6 (7)

b) State and prove Bernoulli's equation, mentioning the assumptions underlying it. (6)

c) What is kinetic energy correction factor ? (2)

5 a) A bend in horizontal pipeline conveying water gradually reduces from 0.6 m to 0.3 m diameter and deflects the flow through angle of 60^0. At the larger end the gauge pressure is 171.65 kN/m^2. Determine the magnitude and direction of the force exerted on the bend, (i) when there is no flow, (ii) when the flow is 876 l/s. (10)

b) What is a Cipoletti weir. Show how the effect of end contraction is compensated in a Cippoletti weir (5)

6 a) A tank is in the form of a hemisphere of 3m diameter and having a cylindrical upper part of 3 m diameter and 5 m height. Find the time required to empty it through an orifice of 50 mm diameter at its bottom if the tank is initially full of water. Take C_d=0.62. (8)

b) Water flows over a rectangular weir 2 m wide at a depth of 200 mm and afterwards passes through a triangular right angled weir. Taking C_d for the rectangular and triangular weir as 0.61 and 0.58 respectively, find the depth over the triangular weir. (7)

PART C

Answer any two full questions, each carries20 marks.

7 a) Derive the Hagen-Poiseulle equation for laminar flow in circular pipes. (10)

b) Determine the rate of flow of water through a pipe of diameter 20 cm and length 50 m when one end of the pipe is connected to a tank and other end of the pipe is open to the atmosphere. The pipe is horizontal and the height of water in the tank is 4 m above the centre of the pipe. Consider all losses and take f=0.036 (10)

8 a) Define Hydraulic Gradient Line and Total Energy Line (5)

b) A plate of 600 mm length and 400 mm wide is immersed in a fluid of specific (10)

gravity 0.9 and kinematic viscosity 10^{-4} m^2/s. The fluid is moving with a velocity of 6 m/s. Determine (i) boundary layer thickness and (ii) shear stress at the end of the plate. Also find the drag force on one side of the plate

c) Explain the phenomenon of boundary layer separation (5)

9 a) Explain "Moody's Chart". What is its use in pipe flow? (4)

b) Two parallel plates kept 0.1 m apart have laminar flow of oil between them with a maximum velocity of 1.5 m/s. Calculate the discharge per unit width, the shear stress at the plates, the difference in pressure between two points 20 m apart, the velocity gradient at the plates and velocity at 0.02 m from the plate. Take viscosity of oil to be 2.453 Ns/m^2. (10)

c) Explain with neat sketches the growth of boundary layer over a flat plate (6)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

THIRD SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

Course Code: CE205

Course Name: ENGINEERING GEOLOGY

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

			Marks
1	a)	Define weathering of rocks. Explain the weathering by mechanical means.	(7)
	b)	Describe any two laboratory test used for assessing intensity of weathering.	(4)
	c)	Sketch the typical soil profile with a short description of each zone.	(4)
2	a)	Define aquifer. Discuss the classification of aquifers.	(5)
	b)	Relate porosity and permeability in aquifers.	(5)
	c)	Explain any three methods to control sub-surface water during the constructions.	(5)
3	a)	Elucidate any three geological classes of soils	(9)
	b)	Explain the relevance of geology in construction engineering.	(6)

PART B

Answer any two full questions, each carries 15 marks.

4	a)	Describe any three physical properties which affect the strength of minerals.	(6)
	b)	Explain: (i) Calcite (ii) Biotite (iii) Gypsum	(9)
5	a)	Give an account of any two rock features that affect the strength of rock as foundation material	(6)
	b)	Discus the origin of igneous rocks and sedimentary rocks	(9)
6	a)	How do earthquake waves help to understand the interior structure of earth?	(6)
	b)	Write short notes on: (i) Basalt (ii) Marble	(9)

PART C

Answer any two full questions, each carries20 marks.

7	a)	Explain strike and dip with figures	(6)
	b)	Describe any two geological factors considered essential in the construction of tunnels	(8)
	c)	How are folds formed in rock? Discuss the significance of fold in selecting feasible sites for dam.	(6)
8	a)	The dip amount and dip direction of two outcrop of a contact between limestone and sandstone, located at a distance of 500m apart, are 20^0 /N150^0 and	(5)

21^0/N$330^{0.}$ Identify the structure and its strike.

b) What are contours? Draw a contour pattern (not on scale) representing a 60m high volcanic cone, with a dry crater of 25m deep, located along sea shore (use contour interval – 20m) (3)

c) List the causes of soil erosion (12)

9 a) What are faults? Describe the parts of a fault with diagram. How do faults differ from joints (10)

b) Describe any three types of mass wasting. (6)

c) Discuss the causes of landslides in Kerala (4)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

THIRD SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019

Course Code: CE205

Course Name: ENGINEERING GEOLOGY

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

			Marks
1	a)	Write a note on the relevance of geology in civil engineering	(10)
	b)	Discuss the engineering significance of weathering	(5)
2	a)	Elucidate on the engineering classification of weathered rock masses	(8)
	b)	Evaluate the porosity and permeability of rocks	(7)
3	a)	Discuss the ground water flow equation using Darcy's law	(6)
	b)	Elucidate the problems created by subsurface water in construction sites	(9)

PART B

Answer any two full questions, each carries 15 marks.

4	a)	Write short notes on Shale	(5)
	b)	Marble	(5)
	c)	Quartzite	(5)
5	a)	Discuss about the seismic discontinuities inside the earth	(7)
	b)	Elucidate on the role of seismic waves in the study of internal structure of earth	(8)
6	a)	Explain hardness of minerals	(5)
	b)	Discuss any five rocks of Kerala	(10)

PART C

Answer any two full questions, each carries20 marks.

7	a)	Describe the attitude of geological structures	(6)
	b)	Discuss any two types of faults in rocks	(7)

c) Examine the role of slope and water in the occurrence of landslides (7)

8 a) Discuss the geological factors to be considered in the selection of reservoir site (12)

b) The dip amount and dip direction of two outcrop of a contact between limestone and sandstone, located at a distance of 500m apart, are 20^0 /$N150^0$ and 21^0/$N330^{0.}$ Identify the structure and its strike. (5)

c) What are contours? Draw a contour pattern (not on scale) representing a 60m high volcanic cone, with a dry crater of 25m deep, located along sea shore (use contour interval – 20m) (3)

9 a) What are the landforms produced by marine erosion and deposition (8)

b) Examine the methods to prevent landslides (5)

c) Discuss the various flood management strategies (7)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

THIRD SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

Course Code: CE207

Course Name: SURVEYING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

			Marks
1	a)	Define local attraction. Which are the different methods of eliminating local attraction in a closed traverse?	(5)
	b)	The following consecutive readings were taken with a level and 5m levelling staff on a continuously slopping ground at a common interval of 20 m, :0.385, 1.030,1.925,2.825,3.730,4.685,0.625,2.005,3.110,4.485. Prepare a page of field book and calculate the reduced level of points if first reading was taken on a bench mark of RL 208.125 m.	(10)
2	a)	Define bearing. Which are the different systems of designating bearings?	(4)
	b)	Distinguish between dip and declination, isogonic and agonic lines.	(5)
	c)	The magnetic bearing of a line AB is S $28^0$30'E. Find the true bearing if declination is $7^0$30' W	(6)
3	a)	Explain the different methods of orientation in plane table survey.	(6)
	b)	Define contour. Which are the different methods of locating contour?	(9)

PART B

Answer any two full questions, each carries 15 marks.

4	a)	Explain repetition method of measurement of horizontal angle.	(5)
	b)	Two triangulation stations A and B are 60 km apart and have elevation 240 m and 280 m respectively. Find minimum height of signal required at B so that line of sight may not pass near the ground than 2 m. The intervening ground has an elevation of 200 m.	(10)
5	a)	Define mass diagram. What are its uses?	(5)
	b)	Explain the different steps in triangulation survey.	(10)
6	a)	Explain prismoidal rule for calculating volume of a plot.	(5)
	b)	A railway embankment is 10 m wide with side slope 1.5 (H) : 1 (V). Assuming the ground to be levelled in a direction transverse to centre line, calculate the	(10)

volume contained in a length of 120 m, the centre height at 20 m interval being in metres 2.2, 3.7, 3.8, 4.0, 3.8, 2.8, 2.5 using trapezoidal and prismoidal formulae.

PART C

Answer any two full questions, each carries20 marks.

7 a) Explain the principle of least squares. (5)

b) Explain the principle of EDM measurement. (5)

c) The following are the mean values observed in the measurement of three angles A, B, C at one station, Calculate the most probable value. (10)

$A = 76^0 42'46.2''$ weight 4

$A+B = 134^0 36'32.6''$ weight 3

$B+C = 185^0 35'24.8''$ weight 2

$A+B+C = 262^0 18'10.4''$ weight 1.

8 a) Define celestial horizon, hour angle, Zenith, Nadir, celestial equator. (10)

b) Explain the operation of total station. (10)

9 a) Explain different types of EDM instruments. Which are the different types of modulation of electromagnetic waves? (10)

b) Form the normal equation for x, y, z in the following equation (10)

$3x+3y+z-4=0$ weight 2

$x+2y+2z-6=0$ weight 3

$5x+y+4z-21=0$ weight 1

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

THIRD SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019

Course Code: CE207

Course Name: SURVEYING

Max. Marks: 100 Duration: 3 Hours

PART A

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

1 a What are general principles of survey? Differentiate between plane and geodetic survey 8

b Explain the principle of levelling with neat sketch. 4

c Define i) base line,ii)Check line iii) Tie line 3

2 a What is the necessity of ranging survey lines. Describe how you would range a chain line between two points which are not visible. 7.5

b Explain the process of profile levelling and cross sectional levelling 7.5

3 a What is reciprocal levelling? How it is accomplished? In reciprocal levelling between two stations A and B the level was set up near A and the staff readings on A and B were 2.645 and 3.220 m respectively. The level was then moved and set up near B, the respective staff readings on A and B were 1.085 and 1.665. Find the true difference in level between A and B. 7.5

b) The following bearings were taken in running a compass survey. 7.5

Line	Fore Bearing	Back bearing
AB	124°30’	304°30’
BC	68°15’	246°0’
CD	310°30’	135°15’
DA	200°15’	174°45’

At what stations do you suspect local attraction? Find the correct bearings of the lines and also compute the included angle.

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PART B

Answer any two full questions, each carries 15 marks

4 a State Simpson's rule and Trapezoidal rule for computation of area. A series of offsets were taken at 3m intervals in the following order from a chain line to a curved boundary 2.16, 1.53, 1.80, 1.98, 1.80, 1.59, 1.80, 2.52, 2.43, 2.40, 2.58, 2.70, 2.91, and 3.06 meters. Find the area between the chain line, curved boundary and the end offsets by Simpson's rule and trapezoidal rule. 7.5

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b Describe the methods of computation of volume by i) Average end formula and ii) Prismoidal formula 7.5

5 a What is transit theodolite and what are the temporary adjustments in Theodolite? 7.5

b The altitudes of two proposed stations A and B, 80 km apart are respectively 225m and 550 m. The intervening obstructions situated at C, 40 km from A has an elevation of 285m. Ascertain if A and B are intervisible. And if necessary find how much B should be raised so that the line of sight must nowhere be less than 3m above the surface of the ground. 7.5

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6 a Explain the terms; 7.5
i) Satellite stations ii) reduction to centre ii) Opaque Signals

b Determine the volume of the reservoir enclosed by the contour lines from the data given below using both prismoidal and trapezoidal formula. 7.5

Contour level (m)	Area enclosed by the contour line (m^2)
100	200
105	300
110	500
115	750
120	1000
125	1500
130	2000

PART C

Answer any two full questions, each carries 20 marks

7	a	Explain the terms (i) Celestial sphere ii) Astronomical Triangle iii) Declination iv) Hour Angle v) Altitude	10
	b	Explain any five laws of weights.	5
	c	Explain the advantages of total station survey	5
8	a	Define modulation and explain the different methods of modulations	5
	b	Explain the principle of EDM	5
	c	The following are the condition equations of different weights. Construct the normal equations for x, y and z. *4x + 2y +z – 11 = 0, wt:3* *3x + 3y +2z – 9 =0, wt:2* *5x + y +3z – 16 =0, wt:4*	10
9	a	Define the term ‘most probable value’and explain the various methods to determine it.	12
	b	What are the fundamental parameters required in Total Station surveying?	8