E   E7250

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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017
Course Code: CE207
Course Name: SURVEYING (CE)

Max. Marks: 100   Duration: 3 Hours

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

1 a) Define the terms; i) Base line ii) Check line iii) Tie line   (3)

   b) Explain the different types of bearings.   (4)

   c) The following readings were taken in a running closed compass traverse.   (8)

Line	FB	BB
AB	49 °55'	230 °00'
BC	177 °45'	356 °00'
CD	104 °15'	284 °55'
DE	165 °15'	345 °15'
EA	259 °30'	79 °90'

   i) State the stations which were affected by local attraction.

   ii) Determine the corrected bearings

   iii) Calculate the true bearings if the declination was 1° 30' W.

2 a) Explain the process of Profile levelling and Cross sectioning levelling.   (7.5)

   b) The following consecutive readings were taken with a level and 5m levelling   (7.5)
       staff on a continuously sloping ground at a common interval of 30m. 0.375 (on
       Q); 1.030; 1.825; 2.935; 3.630; 4.785; 0.625; 2.105; 3.110; 4.485 (on R). Assume
       Reduced level of first point as 208.125m.Make up level page book, Calculate the
       reduced levels of all the points by collimation method and apply usual checks.
       Also find the gradient of QR.

3 a) What are the different methods of orientation in plane table surveying?   (7.5)

   b) What do you mean by Contouring? Describe the methods of contouring with its   (7.5)
       merits and demerits.

PART B
Answer any two full questions, each carries 15 marks.

4 a) Define Mass Diagram. Describe its characteristics   (7.5)

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

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

b) Explain the method of observing the horizontal angle by the method of repetition   (7.5)
and reiteration in triangulation survey. What are the errors eliminated by the
method of repetition?

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

b) The following perpendicular offsets were taken at 10m intervals from a   (7.5)
survey line AB to an irregular boundary line: 2.50, 3.80, 4.33, 6.76, 5.30, 7.25,
8.95, 8.25 and 5.50.Calculate the area in sqm, enclosed between the survey
line, the irregular boundary ,the first and the last offsets by i) Simpsons rule
ii)the trapezoidal rule iii) the average ordinate rule

PART C
Answer any two full questions, each carries 20 marks.

7   a) Explain the terms;   (10)
i) Azimuth   ii) Zenith and nadir iii) Polar distance
iv) Celestial sphere v) Co-altitude

b) What are the advantages and applications of Total Station?   (10)

8   a) State the fundamental principle of the method of least squares and describe how   (4)
to determine the most probable value in direct observations of equal weights?

b) The following are the condition equations of different weights. Construct the   (6)
normal equations for x, y and z.

$4x + 2y + z - 11 = 0, wt:3$

$3x + 3y + 2z - 9 = 0, wt:2$

$5x + y + 3z - 16 = 0, wt:4$

c) Explain the principle of Electromagnetic Distance Measurement and describe the   (10)
types of EDM instruments?

9   a) What are the errors in Total Station survey?   (4)

b) What are the fundamental parameters that can be measured using Total Station?   (6)

c) Explain the laws of weights established from the method of least squares.   (10)

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017
Course Code: CE205
Course Name: ENGINEERING GEOLOGY (CE)

Max. Marks: 100   Duration: 3 Hours

Draw figures wherever necessary

PART A

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

1 a) Evaluate the porosity and permeability factors of intact rock and rock masses.   (3)
   b) Permeability alone cannot be used to judge the flow of ground water. Discuss.   (4)
   c) How long does it take for water subjected to 10m head difference to pass through
       a 5m length of   (2.5)
       1. intact granite which has an isotropic hydraulic conductivity (K) of 1×10^{-12} m/s   (2.5)
       2. fractured sandstone with an isotropic hydraulic conductivity (K) of 1×10^{-4} m/s
   d) From the above two results of time factor of water flow, which among those rocks   (3)
       need care while accomplishing engineering projects affecting subsurface.
2 a) Discuss the significance of O and E horizons of soil profile.   (7)
   b) Examine the role of acids in chemical weathering.   (8)
3   Compare the effectiveness of barriers and liners to control subsurface water in   (15)
       construction sites.

PART B

Answer any two full questions, each carries 15 marks.

4 a) Chemical composition alone is insufficient to name a mineral, Discuss.   (3)
   b) Write a short description on any two properties that are used to identify a mineral   (7)
       species during field work phase.
   c) Why colour and streak of minerals are not always identical?   (2)
   d) Quartz occur less than 10% in majority of crustal rocks. But they form more than   (3)
       60% of sand deposition on earth surface. Why?
5 a) Discuss   (5)
                      i) Granite   ii) Basalt
   b) How do sedimentary rocks differ from metamorphic rocks?   (5)
   c) Discuss any two major rock species outcropped in the state of Kerala.   (5)
6 a) Are the properties (related to strength) desirable for building stones and road   (7)
       aggregates, similar? Evaluate.
   b) Discuss the disadvantages of intensity as a measure of earthquake strength.   (8)

PART C

Answer any two full questions, each carries 20 marks.

7 a) Discuss the origin of folding and faulting of rocks   (5)
   b) Briefly discuss why the knowledge on rock joints is important for the construction   (5)
       of engineering structures.

c) How do the trends of geological structures decide the location of huge civilian constructions like dam and reservoirs? (5)

d) . Identity the category to which the fold having following geometry falls into (5)

       Strike of limb 1 – N60 degrees; Dip of limb 1 – 20 degrees to N 330

       Strike of limb 2 – N 240 degrees; Dip of limb 2 – 20 degrees to N 330

    And draw a cross section of the fold along the limbs

8 a) Assess beach nourishment and relocation of engineering structures as alternatives to hard methods of coastal protection. (10)

    b) Evaluate the negative effects of seawalls and groins as shore protection structures. (10)

9 a) Appraise the benefits of crop rotation and strip farming as soil conservation strategies. (10)

    b) Mass wasting is a tug of war between gravity and friction. Judge this statement in terms of gravity and shear strength of earth materials. (10)

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017
Course Code: CE203
Course Name: FLUID MECHANICS – I (CE)

Max. Marks: 100   Duration: 3 Hours

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

1 a) Two pipelines, one carrying oil of relative density 0.9 and other carrying water are   (8)
       connected to a manometer as shown in Figure 1. By what amount, the pressure in
       water pipeline should be increased so that mercury levels in both the limbs of the
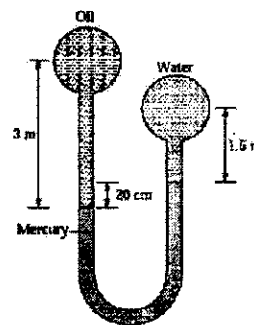   manometer become equal?

Figure 1.

   b) Obtain an expression for centre of pressure of a lamina paced in inclined position.   (7)

2 a) Derive continuity equation in three dimensional Cartesian coordinates.   (7)

   b) A rectangular barge 16 m x 5 m has a depth of immersion of 1.6 m when floating   (8)
       horizontally. The centre of gravity of the barge is 1.9 m above the bottom.
       Determine the angle of tilt if a 50 kN weight is moved across the deck by 3.5 m.

3 a) In a 2-dimensional steady incompressible flow, the velocity components u, v are   (6)

       given by $u = 2x - x^2 y + \dfrac{y^3}{3}$, $v = xy^2 - 2y - \dfrac{x^3}{3}$. Determine the acceleration at

       P(1,3).

   b) A door in a tank retaining water is in the form of a quadrant of a cylinder of 1.5 m   (9)
       radius and 1.8 m wide as shown in Figure 2. Calculate the resultant force on the
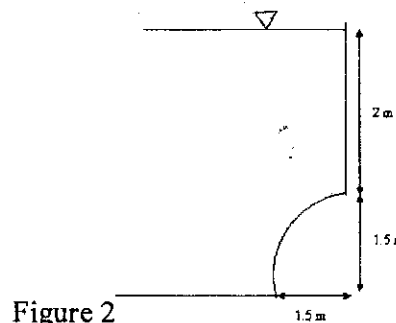   gate.

Figure 2

PART B

Answer any two full questions, each carries 15 marks.

4   a)   Water is flowing through an inclined venturimeter in the upward direction. The   (9)
inlet and throat diameters of the venturimeter are 200 mm and 100 mm
respectively. The pressure at inlet is 19.62 N/cm^2 (gauge) and at throat is 3.92
N/cm^2(vaccum). The length between inlet and throat of the venturimeter is 500
mm and is inclined at $60°$ with horizontal. Find the discharge through the
venturimeter. Take C_d=0.98.

    b)   Differentiate kinetic energy correction factor and momentum correction factor.   (6)

5   a)   A tank has an upper cylindrical portion of 2.5 m diameter and 3 m high with   (10)
hemispherical base. Find the time required to empty it through an orifice of 8 cm
diameter at the bottom, if the tank is initially full of water. Take C_d=0.6.

    b)   Explain the experimental method of determination of orifice coefficients.   (5)

6   a)   Water flows first over a 1 m wide trapezoidal weir at a depth of 0.2 m with a water   (8)
surface width of 1.5 m and then through a right angled triangular weir installed in
a channel. Find the depth of water over the triangular weir if the coefficient of
discharge of trapezoidal and triangular weir are 0.62 and 0.6 respectively.

    b)   Obtain the condition for maximum discharge over a broad crested weir. Also state   (7)
its discharge equation.

PART C

Answer any two full questions, each carries 20 marks.

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

    b)   Two parallel plates kept 100 mm apart have laminar flow of oil between them with   (10)
a maximum velocity of 1.5 m/s. Calculate (i) velocity at 2 cm from the plate (ii)
pressure difference between two points 20 m apart, if the viscosity of oil is 24.53
Poise.

8   a)   Differentiate hydraulic gradient line and total energy line.   (5)

    b)   A 250 mm diameter, 3 km long straight pipe runs between two reservoirs of   (15)
surface elevation135 m and 60 m. A 1.5 km long 300 mm diameter pipe is laid
parallel to the 250 mm diameter pipe from its mid-point to the lower reservoir.
Neglecting all minor losses and assuming a friction factor of 0.02 for both pipe,
find the increase in discharge caused by addition of 300 mm diameter pipe.

9   a)   State the characteristics of boundary layer growth over a flat plate.   (5)

    b)   Explain the methods for controlling boundary layer separation.   (5)

    c)   A smooth flat plate 2 m wide and 2.5 m long is towed in oil of relative density 0.8   (10)
at a velocity of 1.5 m/sec along its length. Find the boundary layer thickness at the
trailing edge of the plate and power required for towing the plate. Take kinematic
viscosity of oil as 1 stokes.

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B   **B7068**

Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: CE201
Course Name: MECHANICS OF SOLIDS (CE)

Max. Marks: 100   Duration: 3 Hours

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

1	a)	Define stress and strain.	(4)
	b)	What are the fundamental types of stresses? Give one example for each type.	(4)
	c)	State and explain Hooke's Law.	(7)
2	a)	Prove that the maximum value Poisson's ratio can have is 0.5	(5)
	b)	A cylindrical bar with two sections of lengths 50cm and 25cm, and diameters 20mm and 15mm respectively, is subjected to an axial pull such that the maximum stress is 150MN/m². Calculate the strain energy stored in bar. E= 200 GN/m².	(10)
3	a)	Find an expression for the elongation of a prismatic bar due to self-weight.	(5)
	b)	A mild steel rod 20mm diameter and 300mm long is enclosed centrally inside a hollow copper tube of external diameter 30mm and internal diameter 25mm. The ends of the tube and rod are brazed together, and the composite bar is subjected to an axial pull of 50N. If E for steel and copper are 200 GN/m² and 100 GN/m² respectively, find the stresses developed in the rod and the tube. Also, find the change in length.	(10)

PART B
Answer any two full questions, each carries 15 marks.

4	a)	Name and explain the various types of beam supports, indicating the reaction components diagrammatically.	(4)
	b)	Derive a relationship between bending moment and shear force.	(5)
	c)	Draw the shear force and bending moment diagrams for a cantilever of span 3m, with a UDL of 10kN/m on the entire span, and a point load of 100kN at the free end.	(6)
5	a)	Draw the shear force and bending moment diagrams for a simply supported beam of span 4m, with a UDL of 10kN/m on the left half of its span.	(7)

b) A cantilever beam with span 3m and cross section 200×300mm is to carry a   (8)
UDL on the entire span. If the tensile stress is limited to 3MPa, what is the
maximum UDL that can be applied on the beam?

6   a) Derive the classic bending equation.   (9)

     b) A simply supported rectangular wooden beam of span 2.5m has cross section   (6)
150mm×250mm and carries a central point load of 100N. Find the shear stressat
50mm below the top edge of the middle cross section.

PART C
Answer any two full questions, each carries 20 marks.

7   a) Draw Mohr's circlefor the two-dimensional state of stress shown in Fig. 2. Find   (14)
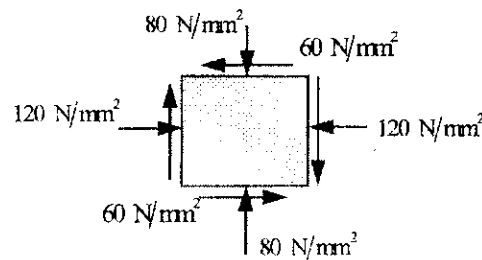the principal stresses and their planes.

Fig. 2

     b) A solid circular shaft is to transmit 75 kW power at 200 rpm. If the shear stress   (6)
is not to exceed 50 MPa, find the diameter of shaft. $G = 100$ GPa.

8   a) A 2m long thin cylindrical shell (both ends closed), internal diameter 90cm and   (10)
thickness 12mm, is subjected to internal pressure $2N/mm^2$. Find 1) hoop and
longitudinal stresses, 2) changes in diameter and length shell. Take $E = 2 \times 10^5$
N/mm^2 and Poisson's ratio $= 0.3$.

     b) Derive an expression for Euler's buckling load for a column fixed at both ends.   (10)

9   a) Using moment-area method, find the deflection and slope at the free end of a   (10)
cantilever applied with a couple at the free end.

     b) Find the buckling load given by Rankine's formula for a tubular strut hinged at   (10)
both ends, 6 m long having outer diameter 15 cm and thickness 2 cm. Given, E
$= 2 \times 10^5 N/mm^2$, $\sigma_c = 567 N/mm^2$ and Rankine's constant, $a = 1/1600$. For what
length of the column does the Euler's formula cease to apply?

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: HS210

Course Name: LIFE SKILLS

Max. Marks: 50   Duration: 2 Hours

PART A
Answer all questions, each carries 6 marks.   Marks

1	a)	What are the different levels of communication?	(3)
	b)	List and explain the different types of barriers in communication.	(3)
2	a)	How does six thinking hat method help in decision making?	(3)
	b)	Differentiate lateral thinking from vertical thinking. What are the four kinds of thinking tools used in lateral thinking?	(3)
3	a)	"A group focuses on individual contribution, while a team must focus on synergy." Explain.	(3)
	b)	Identify the type of group formed / constituted in each of the situations given below	(3)

                (i) An enquiry committee constituted to investigate a specific incident.

                (ii) The Engineering Department of a company.

                (iii) A group of members of a movie fans club.

4	a)	Compare and contrast Kohlberg theory and Gilligan's theory.	(4)
	b)	What ethical responsibilities does an engineer have towards the environment?	(2)
5		Explain the six styles of leadership.	(6)

PART B
Read carefully the following case and answer the questions given below, it carries 20 marks.
(Case study)

You are a trainee accountant in your second year of training within a small company. A more senior trainee has been on sick leave, and you are due to go on study leave. You have been told by your manager that, before you go on leave, you must complete some complicated reconciliation work. The deadline suggested appears unrealistic, given the complexity of the work. You feel that you are not sufficiently experienced to complete the work alone. You would need additional supervision to complete it to the required standard, and your manager appears unable to offer the necessary support. If you try to complete the work within the proposed timeframe but fail to meet the expected quality, you could face repercussions on your return from study leave. You feel slightly intimidated by your manager, and also feel pressure to do what you can for the practice in what are challenging times.

6	a)	Who are the affected parties in the above passage?	(1)
	b)	Identify relevant facts in the above situation.	(3)
	c)	Who should be involved in coming up with a solution to this problem?	(4)
	d)	Would it be right to attempt to complete work that is technically beyond your abilities, without proper supervision?	(4)
	e)	Can you refuse to perform the work without damaging your reputation within the practice?	(4)
	f)	What is the possible course of action that could be taken in this situation?	(4)

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A   A7046

Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017
Course Code: MA201
Course Name: LINEAR ALGEBRA AND COMPLEX ANALYSIS

Max. Marks: 100   Duration: 3 Hours

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

1 a) Find the points where Cauchy-Riemann equations are satisfied for the function   (7)
   $f(z) = xy^2 + i\, x^2\, y$. Where does $f'(z)$ exist? Is the function $f(z)$ analytic at those
   points?

   b) If $v = e^x (x \sin y + y \cos y)$, find an analytic function $f(z)=u+iv$.   (8)

2 a) Show that $u = x^2-y^2-y$ is harmonic. Also find the corresponding conjugate harmonic   (7)
   function.

   b) (i) Find a bilinear transformation which maps $(-i, 0, i)$ onto $(0, -1, \infty)$.   (8)

   (ii) Test the continuity at $z = 0$, if $f(z) = \dfrac{Im\, z}{|z|}, z \neq 0$

   $= 0, z = 0$

3 a) Find the image of the lines $x=1$, $y=2$ and $x>0$, $y<0$ under the mapping $W= z^2$ (8)

   b) Find the image of the semi-infinite strip $x > 0$, $0< y < 2$ under the transformation   (7)
   $w=iz+1$. Draw the regions.

PART B
Answer any two full questions, each carries 15 marks.

4 a) Evaluate $\oint Re\, z^2 dz$ over the boundary C of the square with vertices 0, i, 1+ i,1   (8)
   clockwise

   b) Evaluate $\int \dfrac{4-3z}{z(z-1)}$ dz over the circle $|z|=\dfrac{3}{2}$ (4)

   c) Evaluate $\int \dfrac{3z^2+7z+1}{z+1}$ dz over the circle $|z+ i |=1$ (3)

5 a) Expand $\dfrac{z}{(z-1)(z-2)}$ in (1) $0<|z-2|<1$, (2) $|z-1|>1$ (8)

   b) Evaluate $\int_0^{2\pi} \dfrac{1}{2+\cos\theta}\, d\theta$ (7)

6 a) Using Residue theorem evaluate $\int \dfrac{z^2}{(z-1)^2(z+2)}$ dz over the circle $|z|=3$ (7)

   b) Find the Taylor series of $\dfrac{\sin z}{z-\pi}$ about the point $z= \pi$ (4)

c) Evaluate $\int \frac{\sin z}{z^6} dz$ over the circle |z|=2 using Cauchy's Residue theorem.   (4)

PART C
Answer any two full questions, each carries 20 marks.

7 a) Solve by Gauss-Elimination method x + y + z = 6, x+ 2y- 3z = -4, -x-4y+9z =18.   (7)

b) Find the values of 'a' and 'b' for which the system of equations x + y + 2z =2,

2x-y+3z=10,5x-y+az=b has: (7)

   (i) no solution   (ii) unique solution   (iii) infinite number of solutions.

c) Verify whether the vectors (1,2,1,2), (3,1,-2,1),(4,-3,-1,3) and (2,4,2,4) are linearly

independent in R^4 .   (6)

8 a) Write down the matrix associated with the quadratic form $8x_1^2+7x_2^2+3x_3^2-12x_1x_2$

-8x_2x_3+4x_3x_1. By finding eigen values, determine nature of the quadratic form.   (7)

b) Diagonalise the matrix $A = \begin{bmatrix} 1 & -2 & 0 \\ -2 & 0 & 2 \\ 0 & 2 & -1 \end{bmatrix}$ (7)

c) If A is a symmetric matrix, verify whether AA^T and A^TA are symmetric?   (6)

9 a) Find the eigen vectors of $A = \begin{bmatrix} 3 & 0 & 0 \\ 5 & 4 & 0 \\ 3 & 6 & 1 \end{bmatrix}$ (8)

b) Find the null space of AX=0 if $A=\begin{bmatrix} 1 & 1 & 0 & 2 \\ -2 & -2 & 1 & -5 \\ 1 & 1 & -1 & 3 \\ 4 & 4 & -1 & 9 \end{bmatrix}$ (6)

c) Verify whether $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos\theta & -\sin\theta \\ 0 & \sin\theta & \cos\theta \end{bmatrix}$ is orthogonal.   (6)

What can you say about determinant of an orthogonal matrix? Prove or disprove the

result.

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