ANSWER QUESTION 1 AND ANY OTHER TWO QUESTIONS

Q1. In Figure 1, A and B are two vertical shafts of a mine. The stations X, Y, and Z are underground survey stations in a drive which is linking the two vertical shafts.

Using an assumed bearing of 70° 00' 12" for traverse line A-X, calculate the actual bearing of the survey line X-Y. Given:

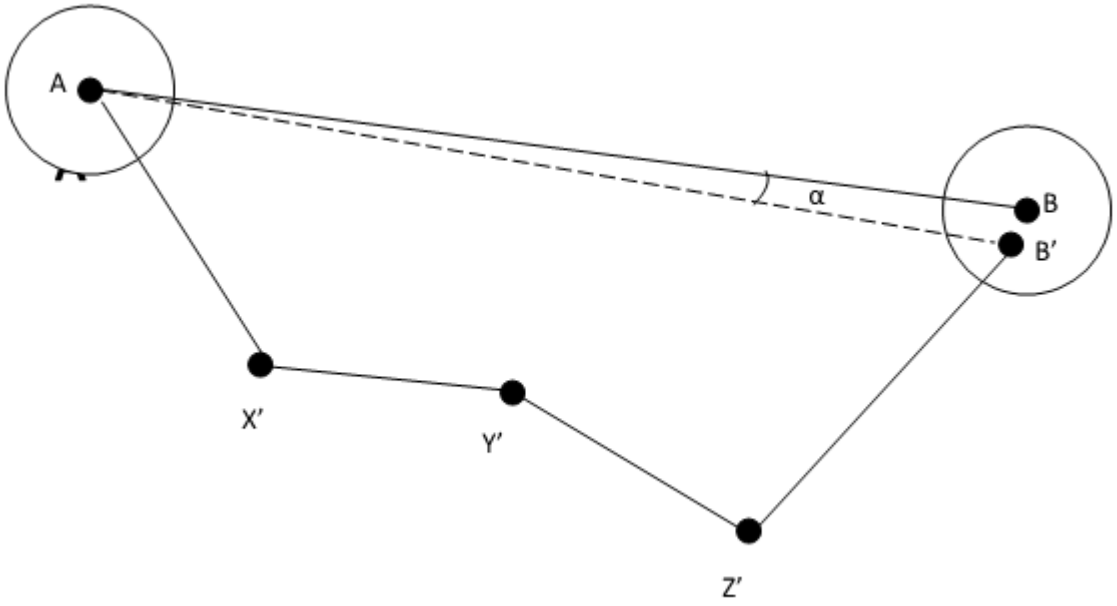

Figure 1Assumed Bearing Method of Correlation

Mean Horizontal Angles		**Horizontal Distances**		**Coordinates**	
				E	**N**
AX′Y′	95 00′ 20″	A-X′	429.37m	A = 500.00 m	1000.00 m
X′Y′Z′	129 49 10	X′-Y′	656.54m	B = 1341.50 m	937.77 m
Y′Z′B′	130 36 20	Y′-Z′	301.838m		
		Z′-B′	287.40m		

[20 Marks]

Q2 a. Write extensively on SHAFT PLUMBING, considering all the factors involved and details of weights etc. **[12 Marks]**

b. Write on the transfer of ELEVATION from surface to underground through a vertical shaft by principles of levelling and support your results with equations. **[8 Marks]**

Q3. a. Write briefly on the following: Whole circle bearing, quadrantal bearing, forward/back bearing and correlation. **[5 Marks]**

b. List and explain the procedures for running underground traverses. **[5 Marks]**

c. Draw the grade chain and label. Explain how it is used in underground tunnel development, as the tunnel is developed in the following directions:

i. Straight, left, right or up **[10 Marks]**

Q4. From the following extracts of an underground field book, determine the coordinates and elevation of the (FLP) peg 163. Instrument at peg 162, HI = 1.252m **[20 Marks]**

Target	**Face**	**Horizontal Circle Readings** ° ′ ″	**Vertical Circle Readings** ° ′ ″	Distance m	Plumb Bob m
BLP peg 161	FL	21 04 30			
FLP peg 163	FL	232 06 30	77 32 00	28.625	0.832
FLP peg 163	FR	52 06 30	282 28 50	28.623	
BLP peg 161	FR	201 04 00			

Given,

Coordinates	**N (m)**	**E (m)**	**Z (m)**
Peg 161	123208.492	104375.293	
Peg 162	123197.746	104363.165	-275.442 BD

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