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|  | **1ª época de Posicionamento Geoespacial I** **07 de Junho de 2019****O exame é sem consulta e tem a duração de 2.5 horas****Cotação: 4+4+3+4+5** |

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| **1. a) Para determinar a cota dos pontos A, B e C do terreno, estabeleceu-se uma linha fechada de nivelamento geométrico apoiada na marca M com cota 101.273 m, tendo-se registado as observações que constam na tabela. Obtenha as cotas ajustadas dos pontos A, B e C.****b) descreva de uma forma sucinta mas completa o princípio de funcionamento de um nível de nivela solidária e de um nível de horizontalização automática.** |

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| **Pontos visados** | **Leituras (m)** | **Distâncias (m)** |
| **atrás** | **frente** | **atrás** | **frente** |
| **M** | **1.289** | **---** | **24.6** | **---** |
| **A** | **1.173** | **1.852** | **13.6** | **24.3** |
| **B** | **1.460** | **1.632** | **24.8** | **13.5** |
| **C** | **1.048** | **0.806** | **13.1** | **24.2** |
| **M** | **---** | **0.688** | **---** | **13.4** |

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| 1. **2. Estacionou-se um teodolito num ponto E do terreno e visaram-se os pontos A e B, tendo sido efectuadas para cada ponto duas leituras conjugadas. Tendo-se obtido o seguinte registo de observações, determine:**

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| **Estação: E** | **Pontos visados** | **Leituras azimutais** | **Leituras zenitais** |
|  | **A** | **Posição directa** | **126g.184** | **99 g.984** |
|  | **B** | **Posição directa** | **284 g.250** | **107 g.460** |
|  | **B** | **Posição inversa** | **84 g.248** | **---** |
|  | **A** | **Posição inversa** | **326 g.172** | **299 g.984** |

1. **as leituras azimutais compensadas para cada direcção.**
2. **o erro de índice do teodolito; o que é o erro de índice?**
3. **a leitura zenital observada na posição inversa para o ponto B.**
4. **as leituras zenitais compensadas para os pontos A e B.**
5. **o rumo da direcção EB sabendo que ME=100.00 m, PE=100.00 m, MA=-100.00 m, PA=100.00 m.**
6. **o rumo do zero da graduação na estação E.**
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|  | **3. Determine as coordenadas planimétricas do ponto E tendo sido medidos os ângulos indicados na figura e a distância horizontal DE=2021.846 m e sabendo que:** **A:**  |
| **4. As coordenadas das estações A e B são conhecidas (MA=434762.19 m, PA=376592.83 m, MB=435476.80 m, PB=377404.35 m); nestes pontos mediram-se, no sentido progressivo, os ângulos azimutais BAC=44g.4931 e ABC=313g.5453. Calcule as coordenadas do ponto C.** |

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| **5. Considere a poligonal que percorre os pontos S, 1, 2, 3 e E. Utilizando todos os dados fornecidos, efectue o cálculo do erro de fecho angular da poligonal.**

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|  | **M** | **P** |
| **S** | **629558.31 m** | **184686.23 m** |
| **E** | **629835.08 m** | **184353.73 m** |
| **T1** | **629413.64 m** | **184827.49 m** |
| **T2** | **629520.96 m** | **184917.46 m** |
| **T3** | **629657.71 m** | **184919.04 m** |
| **T4** | **630137.90 m** | **184635.48 m** |
| **T5** | **629746.20 m** | **184171.56 m** |

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| **Estação** | **Ponto visado** | **Leituras azimutais** |
| **S** | **T1** | **341g.9056** |
|  | **T2** | **382g.4781** |
|  | **T3** | **018g.3694** |
|  | **1** | **121g.0158** |
| **1** | **S** | **28g.5096** |
|  | **2** | **250g.5577** |
| **2** | **1** | **361g.6948** |
|  | **3** | **161g.8552** |
| **3** | **2** | **268g.3904** |
|  | **E** | **105g.6012** |
| **E** | **T3** | **368g.4056** |
|  | **T4** | **040g.0512** |
|  | **T5** | **216g.6580** |
|  | **3** | **375g.5186** |

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