

**FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA**  
**SCHOOL OF POSTGRADUATE STUDIES**  
**DEPARTMENT OF SURVEYING AND GEOINFORMATICS**

PGD First Semester Examination, 2018/2019 Session Course: Geometric Geodesy

Instruction: Answer any Three (3) Questions

Time: 2 Hours

- Q. 1 (a) Explain various ways by which radius of spherical approximation can be chosen for an ellipsoid.
- (b) Show that  $\sin(\phi - \beta) = \frac{f \sin 2\phi}{2W}$
- All symbols have their usual definitions.
- Q. 2 (a) Define geodesic and state its properties.
- (b) State Clairaut's theorem and prove its formula for a geodesic
- (c) Given that at the equator, the azimuth of the geodesic is  $45^\circ$ , calculate its reduced latitude at azimuth  $90^\circ$ .
- Q. 3 Derive expressions for the geodetic coordinates of a point on the earth Surface whose rectangular coordinates are given as X, Y, Z .
- Q. 4 For an ellipsoid,  $a = 6,378,137\text{m}$  and  $f = 1/298.257$ . Calculate the space Rectangular coordinates X, Y, Z whose geodetic coordinates are Latitude =  $06^\circ 30'$  Longitude =  $04^\circ 30'$  height = 50m.
- Q. 5 (a) Why is datum transformation necessary in Surveying?
- (b) Define geodetic datum and briefly describe the parameters that may be needed for its definition.
- (c) List three of the datum transformation methods.