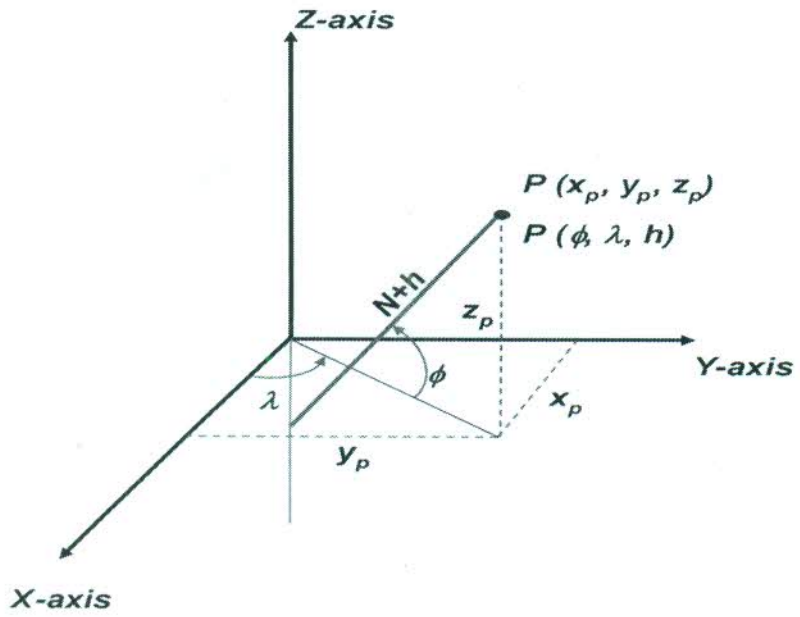
FEDERAL UNIVERSITY OF TECHNOLOGY
SCHOOL OF ENVIRONMENTAL TECHNOLOGY
DEPARTMENT OF SURVEYING & GEOINFORMATICS
FIRST SMESTER EXAMINATION 2018/2019 SESSION

COURSE TITLE: Geodetic Surveying II **COURSE CODE:** SVG515
CREDIT UNIT: 2 **TIME:** 2hrs
INSTRUCTION: Answer Question **ONE (1)** and any other **Two (2)**

Q1. (a).. The figure below depicts the position of a point, P in 3D geodetic space rectangular coordinate system. From the figure, give the relationship between the coordinate element of P in Cartesian P(Xp, Yp, Zp) and geodetic P(φ, λ, h) systems. (5 marks)



(ii).. Given the geodetic coordinate of P as ϕ=10° 30' 30'', λ = 06° 15' 25'' and h = 239.630m on Clarke 1880 ellipsoid with parameters a = 6378249.145m and 1/f = 293.465. Determine the cartesian coordinate of P(X_p, Y_p, Z_p). Hint: $N = \frac{a}{(1-e^2 \sin^2 \varphi)^{\frac{1}{2}}}$, $e^2 = \frac{a^2-b^2}{a^2}$ (10 marks)

(b). State the importance of astronomic latitude and longitude in geodesy and show the relationship between astronomic and geodetic azimuths. (15 marks)

Q2. What is datum transformation? Briefly explain the types and identify the common models for datum transformation. (15 marks)

(b). What are the features of the Earth Centre Earth Fixed (ECEF) Cartesian system? Name the two main ECEF reference frames commonly used today and state their key difference.
(15 marks)

Q3. Give a brief account on the following: (i). Geodetic latitude (ii). Geocentric latitude (iii). Reduced latitude (iv). Geodesic and (v). Normal Section. (15 marks)

(b). Provide the expression for Gaussian Mean Radius of Curvature and state its significance. Why is a Gauss-mid latitude formula the most preferred method for computing distances on the ellipsoid? (10 marks)

Q4. State the basic principles of direct and inverse geodetic problems. Provide the steps for direct and inverse problems using Gauss-mid latitude formula (10 marks).

(b). What do you understand by: i). Meridional and (ii). Prime vertical radii of curvature, support your answer with relevant equations and state their properties on the pole and at the equator. (10 marks)

Q5. What do you understand by the term ellipse? Identify the basic parameters for defining the geometry of an ellipsoid and provide the equations relating them. (10 marks)

(b). Briefly explain Local and Global geodetic datum. What are the basic considerations for modern geodetic datum determination? (10 marks)