

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

MTECH First Semester Examination 2018/2019 Session, Course: Physical Geodesy

Instructions: Answer Any Four Questions

Time: 3 Hours

- Q. 1. (a) Briefly explain the concept and state the properties of least squares collocation  
(b) Define earth gravity field and prove that the gravity potential exterior to the earth's surface is not harmonic.

- Q. 2. (a) List the causes for the variations in the earth gravity fields.  
(b) Explain the isostatic theories of gravity reduction and the importance of gravity reduction in physical geodesy.

- Q. 3. (a) Differentiate between gravity potential and disturbing potential.  
(b) Show that the gravity anomaly ( $\Delta g$ ) and the disturbing potential (T) are related by the following equation:

$$\Delta g = -\frac{\partial T}{\partial r} - \frac{2T}{r}$$

- Q. 4. (a) What is boundary value problem in physical Geodesy?  
(b) Discuss the gravimetric method of the solution of boundary value problem on the geoid.

- Q. 5. (a) State the importance of earth gravity field.  
(b) Discuss fully what you understand by the following terms:  
(i) Regional and residual gravity anomalies  
(ii) Orthometric height and Geopotential number  
(iii) Reduced and normal gravities.

- Q. 6. (a) Discuss fully the satellite method of determining the figure of the earth.  
(b) Discuss Newtons' laws of gravitation. Given the gravitational constant to be  $6.66 \times 10^{-8} \text{ cm}^3 \text{ g}^{-1} \text{ sec}^{-2}$  and the masses of two bodies at 5km apart are  $8 \times 10^5 \text{ kg}$  and  $2 \times 10^6 \text{ kg}$ . What is the magnitude of the gravitational attraction between the two bodies.