

Indian Institute of Technology

Date..... Time **2 hours**..Full Marks...**60**.....No. of Students:....**24**
Mid-Autumn Semester **2009-10** Dept **Geology and Geophysics** Subject No **GG41011**
1st year M. Sc.(Geology) Subject name : **Geophysical Prospecting**

Instruction: Answer all questions. Marks are indicated for each question.

1. Answer the following questions. (5×3=15)
 - a) What is geoid and spheroid?
 - b) What are the ambiguities in gravity data interpretation?
 - c) What are regional and residual anomalies?
 - d) Illustrate with sketches the nature of Bouguer and Free air gravity anomaly when a structure or region is 100% isostatically compensated.
 - e) The uplift of former beaches around the Gulf of Bothnia is about 275 m. What thickness of the ice would be needed to depress them back to the sea level? (Density of ice, 0.9 g/cc; density of asthenosphere, 3.2g/cc)

 2. How and why do the methods of reduction of land gravity and magnetic data differ? (10)

 3. What are the elements of the earth's magnetic field, explain with a diagram. Show the relationship between them. Amongst various quantities which are important and measured in prospecting and why? (10)

 4. Compare and contrast the Fluxgate and Nuclear Precession magnetometers. (5)

 5. Explain the basic principle of electrical prospecting methods. What are the applications and limitations of electrical methods? (4)

 6. Name electrical properties that are important in electrical prospecting. Explain electrochemical activities in detail. (4)

 7. Name the electrode configurations used for mapping lateral and vertical variations in the subsurface resistivity. How can 2-D and 3-D variation in resistivity be mapped? (4)

 8. Draw various electrode arrays used in electrical prospecting and derive the expression for geometrical factor for Schlumberger array. (4)

 9. How will electrical current density deviate when it enters into a resistive and conducting medium compared to homogeneous half-space of uniform resistivity? How will magnitude of potential difference differ compared to the homogeneous half-space over a resistive and conducting medium? (4)
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