

Ex/SC/GEOL/UG/DSE/TH/01/B/2025

B. SC. GEOLOGICAL SCIENCE EXAMINATION, 2025

(3rd Year, 1st Semester)

GEODYNAMICS

PAPER : DSE/TH/1b

Time : Two Hours

Full Marks : 40

(Use separate answer scripts for each Part)

Part-I (20 marks)

Attempt *any five* questions :

4×5=20

1. Do you think the mantle convection occurs in two layers within the earth? Justify your answer with evidences.
2. What do you mean by adiabatic equilibrium condition of mantle? What happens if the adiabatic equilibrium does not reach in the mantle?
3. What are the different isostatic models? Which model is more acceptable in the earth?
4. How does the phase change from olivine to spinel play a crucial role in plate tectonics?
5. In an area, the magma raises the overburden rock materials and deforms it into a domelike shape. Considering the equation of bending theory of an elastic plate, derive the deflection of overlying layer with thickness h and length L . P is the vertical pressure exerted by magma. D is the flexural rigidity of the layer.

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[Turn Over]

(2)

6. The southern half of Mars is about 3 km higher than the northern half. But there is almost no gravity anomaly associated with this 'hemispheric dichotomy'. Do you think that the isostatic principle is maintained there? Justify your answer.
7. A sedimentary basin has a thickness of 4 km. Assuming that the crustal stretching model is applicable and the thickness of continental crust, density of the mantle, crustal material and the sediments are 30 km, 3300 kgm^{-3} , 2700 kgm^{-3} and 2500 kgm^{-3} respectively, determine the stretching factor (α).

Part-II (20 marks)

Answer *any four* questions. 5×4=20

1. Describe the internal structure of the earth using seismic data. 5 [CO4]
2. Discuss the origin of the Earth's Magnetic Field on the basis of core dynamics. 5 [CO4]
3. Write short notes on the following (*any two*) : 2×5=10
[CO5, CO4]
 - (i) Temporal Variation
 - (ii) Triple Junction
 - (iii) Sea-floor Spreading
4. Describe the Plate Tectonic Theory and its evidences. 5 [CO3]

(3)

5. How do you explain plate motion with respect of Euler's Pole? 5 [CO3]
6. How do you construct APW Path through the past geologic time? 5 [CO3]

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