

B. SC. GEOLOGICAL SCIENCE EXAMINATION, 2023

(3rd Year, 1st Semester)

GEODYNAMICS

PAPER – DSE/TH/1B

Time : Two hours

Full Marks : 40

(Use a separate Answer script for each Part)

PART – I (20 Marks)

Attempt all questions.

1. Define 'isostasy'? Using suitable sketch write the principle of the most accepted isostatic model of the earth.

1½ + 2½

OR

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.

4

2. An elastic plate is pinned at both ends and subjected to a horizontal force P . Applying the equations of bending theory of thin elastic plate determine the critical horizontal force required to buckle the plate.

12

OR

With the help of equations of bending theory of thin elastic plate derive the geometry of profile of lithospheric plate under the load of sea mount.

12

3. With the help of suitable sketches explain the conditions for the development of fold-thrust-belt and basin in the back arc region of a convergent lithospheric boundary.

4

OR

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 kg m^{-3} , 2700 kg m^{-3} , and 2500 kg m^{-3} respectively, determine the stretching factor (α).

4

[Turn over

[2]

PART – II (20 Marks)

- Q2. Answer any four (4) questions: 4 X 5 = 20**
- a) **Explain the origin of earth's magnetic field by a suitable model. 5**
 - b) **What is Geodynamics? What kind of things do we measure here? What techniques are used in Geodynamics? 1+2+2=5**
 - c) **Describe the stages of Wilson Cycle of opening and closing of basin. 5**
 - d) **Explain the theory of continental drift, and list the evidence that supports this theory. 5**
 - e) **Discuss about the temporal variation of Earth's magnetic field. How does it affect on crustal magnetic field? 3+2=5**
 - f) **Describe the internal structure of the earth using velocity of earthquake waves. 5**
 - g) **Define seafloor spreading and describe how reversals in the earth's magnetic field appears on the seafloor. 5**
 - h) **Draw a suitable sketch of ocean-ocean convergent plate boundary with its associated geologic features. 5**