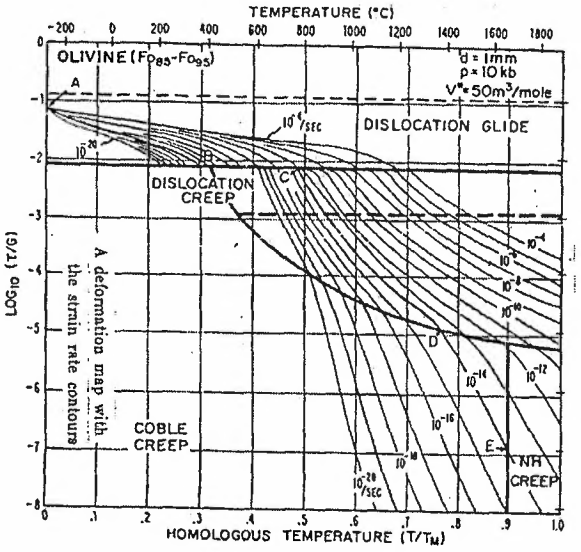
Date: 21/02/2019 AN Time 1 Hr. Full Marks *20* No. of Students 136
Spring Semester *2018-2019* Department of *Earth Sciences* Sub. No. *ES2201*
2nd Yr. BS-MS *Earth Sciences (Pre-Major)* Sub. Name *Geophysics*
Instruction: **Answer all questions. Please write brief and to the point answers.**

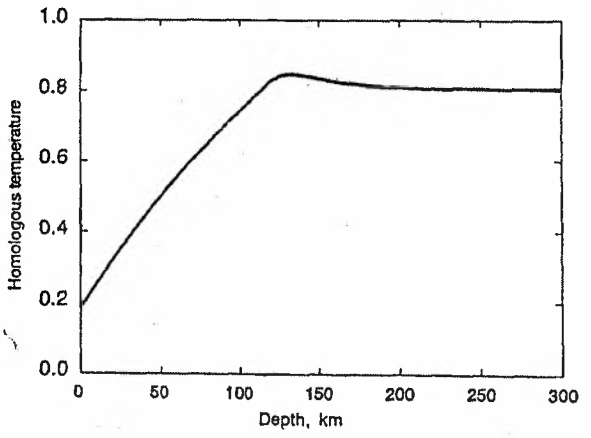
Q1. Considering the Himalayan mountains as a line load on a broken Indian lithospheric plate, it is observed that the Himalayan foreland basin is depressed with a half-width of 150 km. Estimate the elastic thickness of the Indian plate, considering it to be Poisson's solid with mantle density = 3.3 x 10^3 kg/m^3, sedimentary rock density of 2.7 x 10^3 kg/m^3, Young's modulus = 70 GPa and g = 10 m/s^2.

(10)

Q2. (a) For a mountain range of 1 km elevation with density of 3 x 10^3 kg/m^3 on an elastic plate of 100 km thickness, calculate the homologous stress and strain rate over geologic time scales (i.e. 1 million years).
(b) Using the plots below estimate the homologous temperature and ascertain the depth below which the lithosphere will creep and adjust isostatically.
Use g = 10 m/s^2 and shear modulus = 3 x 10^{11} N/m^2.

(5+2=7)





Q3. Write down the expressions for seismic moment and the moment magnitude scale.

(3)

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Name of Paper setter

Signature of Paper-setter