

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034
B.Sc. DEGREE EXAMINATION – PHYSICS
V SEMESTER – NOVEMBER 2003
PH 5400 / PHY 400 – GEO PHYSICS

07. 11. 03
1.00 – 4.00.

Max. : 100 Marks

PART–A

Answer All questions

(10 x 2 = 20 marks)

01. What is a P – wave? What is its velocity?
02. State the generalised form of Snell's law, with a ray diagram.
03. Distinguish between surface waves and body waves with respect to their intensity variation with distances
04. What are the quantities that can be measured using a Seismometer?
05. Bring out the difference between focus and epicentre of an earth–quake.
06. Write down the Laplace's and the Poisson's equation obeyed by the gravitational potential.
07. What is the cause of the main (magnetic) field of the earth according to the dynamo theory?
08. Explain briefly, the Gauss method of determining the earth's magnetic field
09. Give the decay schemes of the radio nuclide K^{40} .
10. List the two possible sources of heat within the Earth.

PART–B

Answer any FOUR questions

(4 x 7 ½ = 30 marks)

11. Calculate the bulk modulus and the shear modulus of a material having the following properties.
Density = 4000 kg / m³; dilatational velocity (α) = 10 km / s and shear velocity (β) = 6 km / s.
12. Outline the principle and the construction of the strain seismograph with a simple diagram.
13. a) State the relation between the energy released and the magnitude of an earth–quake
b) Compare the energies released in earth quakes of magnitudes $M = 6$ and $M = 2$.

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14. Explain the dynamo theory of earth's magnetism with the help of the Faraday disc generator.

15. Obtain an expression for the variation of temperature with depth below the surface of the earth.

PART-C

Answer any **FOUR** questions

(4 x 12 ½ = 50 marks)

16. a) Find an expression for the time of travel of a seismic wave due to refraction in the outer layers of earth (6 ½ mark)

b) Derive an expression for the gradient of density in terms of velocities of body waves (6 mark)

17. Discuss the theory of a horizontal seismograph with a neat diagram and explain all possible cases.

18. Explain the working of (I) Hammond and Faller method (of measuring gravity) and ii) Worden gravimeter, with neat diagrams (6 + 6 ½)

19. Explain the theory of (I) Saturation magnetometer and (ii) alkali vapor magnetometer. (5 + 7 ½)

20. Give the theory of radioactive dating of rocks and minerals using (i) the decay scheme of Rb⁸⁷ and (ii) the decay scheme of K⁴⁰ .

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