The Open University of Sri Lanka

Department of Zoology
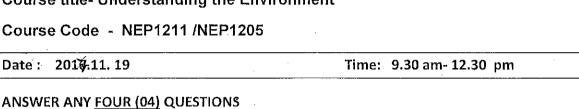
Masters Degree in Environmental Science

Academic Year 2016/2017

Level 7

Final Examination

Course title- Understanding the Environment

Course Code - NEP1211 /NEP1205

Date : 2016.11. 19   Time: 9.30 am- 12.30 pm

ANSWER ANY FOUR (04) QUESTIONS

1. (i) What drives lithospheric plates?   *(20 marks)*

    (ii) Alfred Wegener thought that all continents were once connected. Explain three

    observations that led to this belief.   *(20 marks)*

    (iii) How and where mid-ocean ridges formed?   *(20 marks)*

    (iv) List the major elements that combine to form 98% of the materials in the crust.

                                                                              (20 marks)

    (v) Explain the Mohs scale of hardness.   *(20 marks)*

2. (i) Give a diagram of the rock cycle to show the relationship between the three rock types

                                                                              (20 marks)

    (ii) Explain how the gold is formed in the Earth's crust?   *(20 marks)*

    (iii) What is the significance of fossils to a geologist .   *(20 marks)*

    (iv) Describe the different possible origins of limestones.   *(20 marks)*

    (v) What is rock metamorphism? What limits the maximum temperatures possible in rock
    metamorphism?   *(20   marks)*

3. (i) Define the following terms (in words and using formulas, where applicable; give units; give typical values or appropriate diagrams). Describe where and how they are used.

    (a) Porosity   *(10 marks)*

    (b) hydraulic conductivity   *(10 marks)*

    (c) Pumping test   *(10 marks)*

    (d) Perched water table   *(10 marks)*

(ii) Draw labelled diagram to explain the difference between a confined aquifer and an unconfined aquifer   *(20 marks)*

(iii) Explain the different groundwater aquifer systems in Sri Lanka   *(20 marks)*

(iv) Describe the existence of groundwater in hard rock terrains   *(20 marks)*

4. (i) Illustrate the variation in atmospheric air density and pressure with height using suitable diagrams.

                                          (20 marks)

(ii) Derive the Hydrostatic equation,

$$\alpha dp = -gdz \quad \text{using first principles.}$$

                                          (20 marks)

(iii) Define the terms (a) Geo potential

                        (b) Geo potential height

                                            (10 marks)

(iv) Starting with Hydrostatic equation derive the equation,

$$z_1 - z_2 = \frac{R_d}{g_0} \int_{P_1}^{P_2} T_V \frac{dP}{P} \qquad \textit{(15 marks)}$$

(v) Show that for an isothermal atmosphere, the equation obtain in (iv) can be written as

$$z_1 - z_2 = \frac{R_d T_v}{g_0} \int_{P_1}^{P_2} \frac{dP}{P}$$

(10 marks)

(vi) Calculate the thickness of the layer between the 1000 mb and 500 mb pressure surface, at a point in the tropic where the mean virtual temperature of the layer is $9^0 C$

(25 marks)

5. (i) Explain briefly how microorganisms maintain Nitrate (NO_3^-), Sulphate (SO_4^{-2}) and Phosphate (PO_4^{-3}) nutrient levels in the soil.   (50 marks)

(ii) Discuss the human impacts on cycling of these nutrients in the biosphere.

(50 marks)

6. Discuss the adaptations that can be seen in the organisms living in the freshwater habitats.