IIT JAM 2024 NAT Model Questions

Subject - Geology (GG)

Q.1 Within a fourth order drainage basin, the total lengths of the 1st, 2nd, 3rd and 4th order streams are 10.5 km, 7.5 km, 5.5 km and 1.5 km, respectively. If the drainage density of the basin is 0.5 km^{-1}, the basin area is _____ km^2 . (In integer)

Q.2 A soil has a void ratio of 0.5. The total porosity of the soil is _____. (Round off to two decimal places)

Q.3 The average unit weight of the uppermost part of the crust is 25000 N/m^3 . The vertical stress at a depth of 1 km would be _____ MPa. (In integer)

Q.4 The radius of the Earth's circular orbit around the Sun is 149×10. km. The Earth takes 365 days to orbit the Sun. The tangential velocity of the Earth is _____ km/hour. (= 3.14) (Round off to one decimal place)

Q.5 A borehole inclined at 60º to the horizontal pierces a vertical basaltic dyke of uniform thickness. If the length of the basaltic drill core along the core axis is 12 m, the thickness of the dyke is _____ m. (In integer)

Q.6 The retardation of a uniaxial negative mineral of thickness 0.03 mm is 5160 nm in its principal section of indicatrix. If the refractive index corresponding to the E-ray is 1.486, the value of the refractive index (correct to three decimal places) of the O-ray is ____

Q.7 A spherical ore body (diameter=40m) has 7% metal content and density of 3300 kg/m^3 . The reserve (in tonne) of the ore body is ____

Q.8 From the data shown in the table, the weighted mean size (in micrometre, correct to two decimal places) of the sediment population is _____.

Grain size (micrometre)	Dry sediment weight (in gram)
4	50
20	75
40	125
60	50

Q.9 An eclogite consists of garnet (60%) and omphacite (40%), where the mineral abundances are in mole %. X_{Mg} [=Mg/(Mg+Fe^{2+})] of garnet and omphacite is 0.50 and 0.75, respectively. The X_{Mg} of eclogite is ____ .

Q.10 A harzburgite contains pure forsterite and pure enstatite in a molecular ratio of 60:40. The mole % of MgO in the rock is ____.

Q.11 Assuming the Earth to be an ideal sphere, the volume % of the core relative to the total volume of the Earth is _____ (answer in one decimal place).

Q.12 Based on 8 oxygen atoms, the number of silicon atoms in a plagioclase of composition $Ab_{20}An_{80}$ is ____ (answer in one decimal place).

Q.13 600 tons of low grade iron ore (40% Fe) are blended with 400 tons of high grade iron ore (65% Fe). The grade of the blended ore is _____ % Fe (answer in one decimal place).

Q.14 The mass of a fully dried rock sample of volume 100 cm^3 is 300 g. The mass of the sample, when fully saturated with water of density 1.00 g/cm^3 , is 325 g. Assuming no volume change, the computed porosity of the rock is _____ % (answer in one decimal place).

Q.15 When a dunite comprising pure forsterite undergoes melting, the weight % of MgO in the melt is _____ (answer in one decimal place; given molecular weights of SiO2 = 60.08; MgO = 40.30).

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ANSWER KEY

Question No.	Question Type (QT)	Subject Name (SN)	Key/Range (KY)	Mark (MK)
1	NAT	GG	50	1
2	NAT	GG	0.33 to 0.34	1
3	NAT	GG	25	1
4	NAT	GG	106817.0 to 106818.0	1
5	NAT	GG	6	1
6	NAT	GG	1.658 to 1.658	2
7	NAT	GG	7735 to 7745	2
8	NAT	GG	32.00 to 33.00	2

9	NAT	GG	0.60 to 0.60	2
10	NAT	GG	60 to 60	2
11	NAT	GG	14.0 to 18.0	2
12	NAT	GG	2.2 to 2.2	2
13	NAT	GG	50.0 to 50.0	2
14	NAT	GG	25.0 to 25.0	2
15	NAT	GG	57.0 to 57.5	2

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