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PESHAWAR

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Question 1

(1)

Given

$K_1 = 17ft$

$K_2 = 14\,ft$

$E = 28000\,ks$

$I = 1400$

Equation

$$K_{eq} = \frac{12EI}{h_1^3} + \frac{12E_1}{h_2^3}$$

$$= 12EI\left[\frac{1}{h_1^3} + \frac{1}{h_2^3}\right]$$

$$= 12 \times 2900 \frac{k}{in^2} \times 1200\ in^4 \left[\frac{1}{17 \times 12 in^3} + \frac{1}{14}\right.$$

$$= \frac{1}{13481272} + \frac{1}{4741632}$$

$$= 0.000000742 + 0.000000021$$

$$= 118.68\ k/in$$

$K_{eq} = 1424.18\ k/ft$

(2)

Given

$E = 29000\ ks$

$k_{spring} = 300\ lb/ft$

Solution

$k_1 = 300\ lb/ft$

$k_2 = \frac{3EI}{l^3}$

$= \frac{3 \times (2900\ k/in^2) \times \left[\frac{\pi}{64} \times (2in)^2\right]}{(12 \times 12)^3}$

$= 432.4\ lb/ft$

$k_{eq} = \frac{k_1 k_2}{k_1 + k_2} = \frac{300 \times 432.4}{300 + 432.4}$

$k_{eq} = 176.7\ lb/ft$

Question:. 2

Given

$m = 500kg$

$p(t) = 5000\sin 150t$

damping ratio = 7%

$V = 15$

Required

Stiffness of isolators = ?

amplitude of force = ?

Solution

From given eq $1(t) = 500\sin 150t$

$4(g) = 5000$

$4(g) = \frac{5000}{12} \times \sin 150t$

$4(g) = 450\sin 3 \text{ ft/sec}^2$

Now

$K = \frac{2 \times 3EI}{L^3}$

$f_{so} = 4_{to} \times K$

$= \frac{.450}{12} \times 3 \times 2900 \times 24$

$f_{so} = 875 \text{ lb}.$

amplitude of force is 875 lb.

and

$K = \frac{f_{so}}{4_{to}} = \frac{875}{.475}$

$\omega_n = \sqrt{K/m}$

$= \sqrt{\frac{24755}{500}} = .73$

$K = 25755 \text{ lb/ft}$

Question 3:-

Given

$F_o = 25$

$\omega = 75$

Solution

The mediom equation of videos camera is expresed

$$mn + kn = f(t)$$

$$f(t) = F_o \sin \omega t$$

$$F_o = 25 \sin 75t$$

$$\omega = 75.39 \text{ rad/sec}$$

$$X = \frac{F_o}{(K - \omega^2)}$$

$$K = \frac{F_o}{x} + m\omega^2$$

$$K = \frac{25}{.005} + 3(75.39)^2$$

$$K = 16370 \text{ N/m}$$

Area

$$I = \frac{bH^2}{12}$$

$$A = \frac{EI \times 12}{bH}$$

$$= \frac{70 \times 10^6 \times 12}{4 \times 3}$$

$$= 250 \text{ mm}$$

$$\text{Area} = 187.46 \text{ mm}^2$$

4. What is meant by plate boundries and explain different types of Plate boundries along with diagram?

A plate boundries is a region where plates meet. The plate may either collide, move away from each other or slip, slide past each other Most geologic activities including volcanoes, earthquakes and mountain building take place at plate boundries

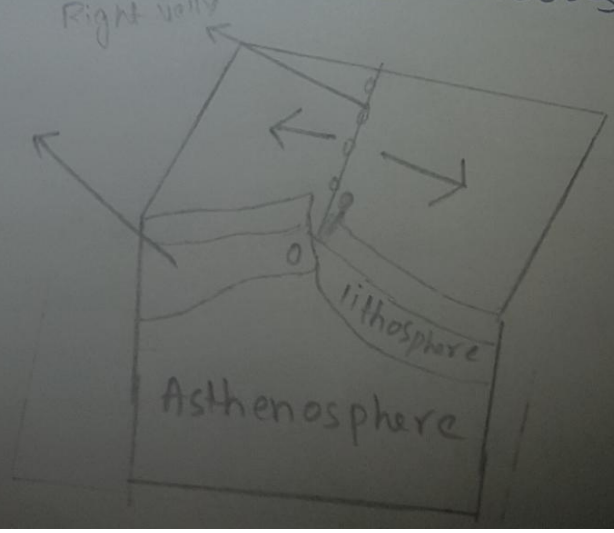
Types of plate boundries

There are 4 types of plate boundries-

→ Divergent boundries
→ Convergent boundries
→ Transform boundries
→ Plate boundry zone

1. Divergent plate boundries

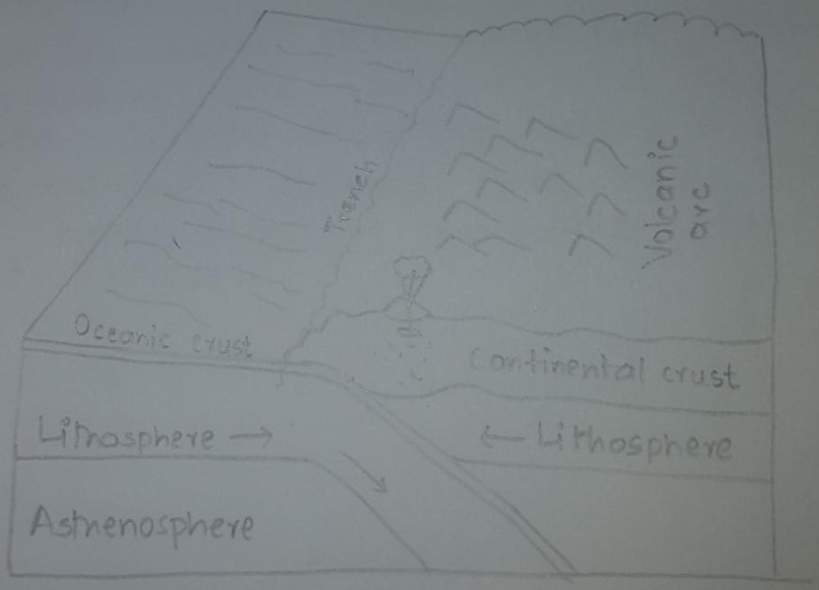
- Occur when two tectonic plates moves away from each other-
- Along these boundries, Lava spews from long fissures and geysers spurt superheated water-
- Frequent earthquakes strike along the rift



2. Convergent boundry (Destructive)

- When two plates come together, the impact of the two colliding plates buckles the edge of one or both plates up into a rugged mountain range and sometimes bends the other down into a deep seafloor trench.
- If one of the colliding plates is topped with oceanic crust, it is forced down into the mantle where it begins to melt.
- Magma rises into and through the other plate solidifying into new crust. Magma formed from melting plates solidifies into ganite, a light colored, low density rock that makes up the continents.

Diagram

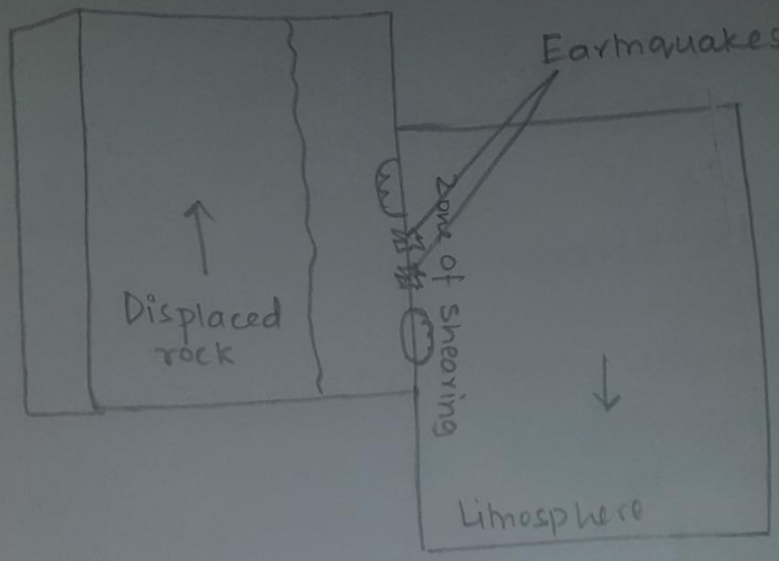


3- Transform Boundries (conservative)

- Two plates sliding past each other, Natural or human made structure that cross a transform are offset - split into pieces and carried in opposite directions.
- Rocks that line the boundry are pulverized

as the plates are pulverized as the plate grind along creating a linear fault valley or undersea canyon-

Diagram



4. Plate boundry zone

- Plate boundry zones ocur wher the effects of interactions are unclear and the boundries usually ocuring along a broad belt are not well defined and may show various types typer of movements in differet episodes-

5. What is meant by degree of freedom? And differentiate b/w continous and discrete systems?

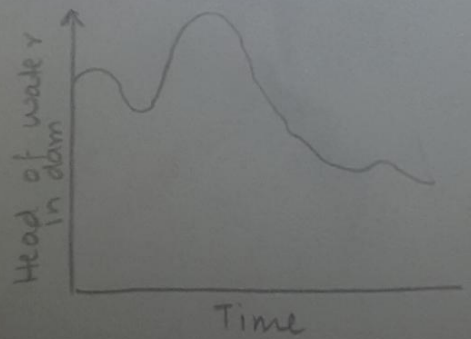
Degree of freedom

It is defined as number of independent variables required to completely determine the positions of all parts of a system at any instant of time

Difference b/w Continous and discrete systems?

Continous system

- A continous system is one in which the state variable chang continously over time
- example :- In factory machining proceeds are continous system
- Head of water behind a dam.
- State changes may occur continously over time.
- Graph :-



Discrete system

A discrete system is one in which the state variable change only at a discrete set of points in time.

example of discrete system is in the factory the start and finish of Job are discrete changes

- state change ocurs at isolated points
- Graph :-