EXAMPLE

Given: Five span continuous beam shown in Fig. 3.8.

All spans are 5 meters

Beam cross-section is, 250×500 mm

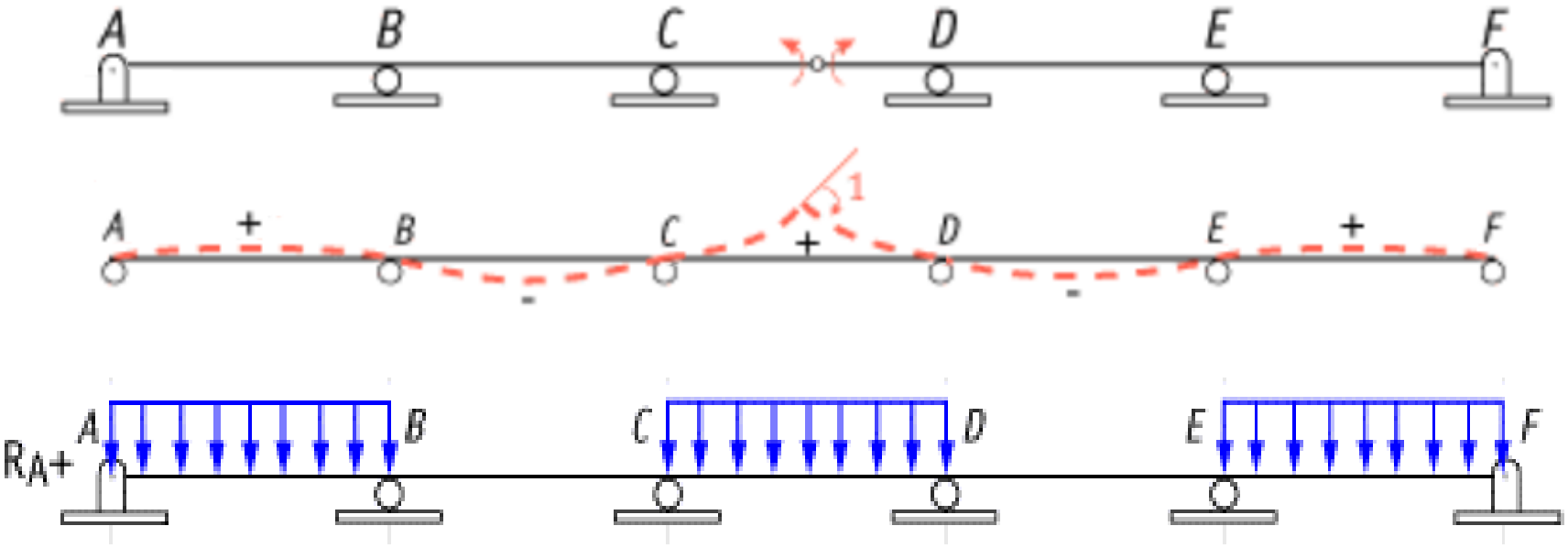
Dead load = 25 kN/m

Live load = 20 kN/m

Required : Using the load combination 1.4G+1.6Q

- Compute the maximum design moment at the span of beam CD
- Compute the maximum design moment at support C
- Compute the maximum design shear for beam CD at support C
- If C20 grade concrete and S420 grade steel are to be used, what would be the design strength for concrete and steel?

EXAMPLE



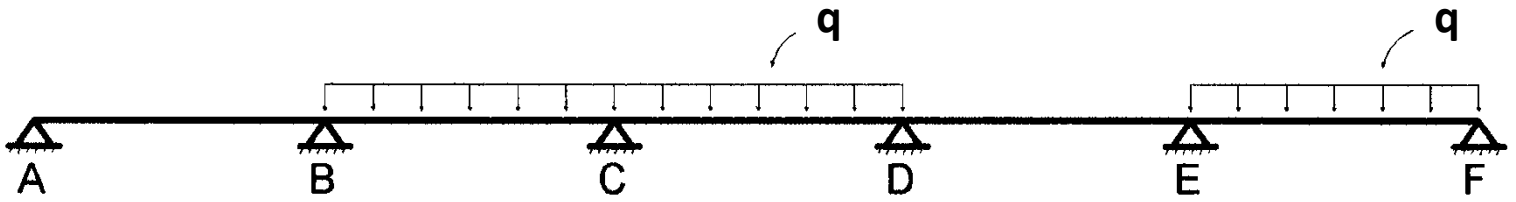
a) Dead load is placed on all spans, resulting in the span moment (positive) of 28.8 kN·m for span CD. For maximum live load moment, the load arrangement is the one shown in above figure, M_q = 42.8 kN·m .

The design moment is,

$+M_d = 1.4\times28.8+1.6\times41.8=108.8$ kN·m

EXAMPLE

(a)

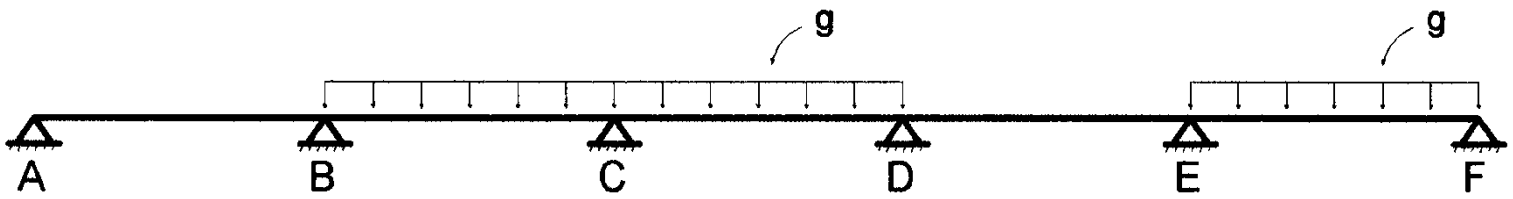


(b)

b) The dead load moment at support C is calculated by loading all the spans, M_g = -49.3 kN·m . For the live load, using the arrangement shown in the figure, M_q = -55.6 kN·m is found. The design moment at C is :

$-M_d = 1.4(-49.3) + 1.6(-55.6) = -158$ kN·m

EXAMPLE



(b)

c) Dead load shear of span CD at support C is calculated by placing the dead load on all spans, V_g = 62.5 kN.

The load arrangement is the one shown in figure, resulting in

V_q = 59.1 kN.

V_d = 1.4(62.5) + 1.6(59.1) = 182 kN

EXAMPLE

d) f_{ck} = 20 MPa and f_{yk} = 420 MPa.

The material factors are, γ_{mc} = 1.5 and γ_{ms} = 1.15.

The design strengths would be,

f_{cd} = 20/1.5 = 13.3 MPa or simply 13 MPa

f_{yd} = 420/1.15 = 365 MPa