

CE206 Strength of Materials

Class : S.Y.B.Tech.(Mech. Div.I and II)

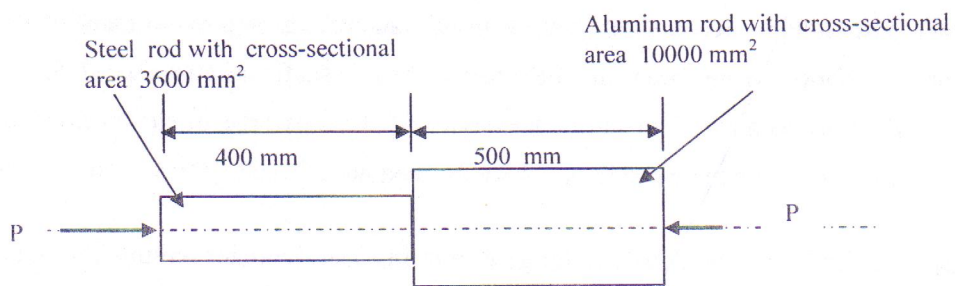
Date : 27.11.2011

Time : 8.00 am to 11 .00 am

Max. Marks : 50

Instructions : All questions are compulsory
Use of non-programmable calculator is allowed.
Assume suitable data if necessary.

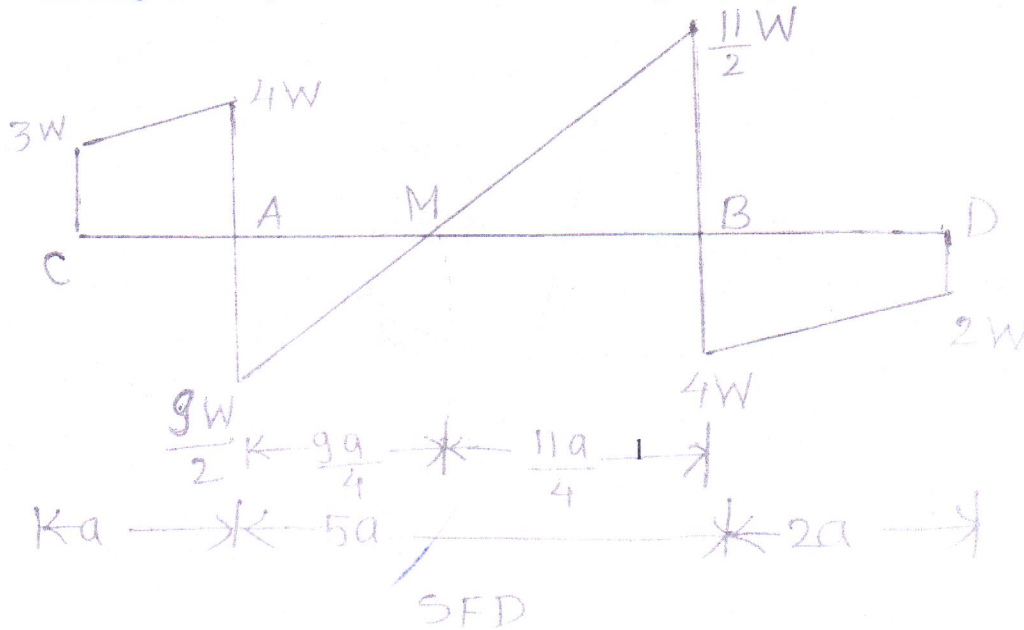
Q.1 A) A member made from steel and aluminum as shown in figure is subjected to axial compressive load 'P' that will cause decrease in total length by 0.3 mm. Neglecting the buckling of member calculate the magnitude of 'P'. Take E for steel = 2×10^5 MPa and E for aluminum = 0.7×10^5 MPa (3)



B) A steel punch can be worked to a compressive stress of 800 N/mm^2 . Find the least diameter of hole which can be punched through a steel plate 10 mm thick if its ultimate shear strength is 350 N/mm^2 . (2)

C) A bar of 30 mm in diameter was subjected to tensile load of 54 kN and the measured extension on 300 mm gauge length was 0.112 mm and change in diameter was 0.00366 mm. Calculate Poisson's ratio and values of three moduli. (3)

Q 2) A) Construct the loading diagram and the bending moment diagram for a beam from its shearing force diagram which is as shown in the figure. Explain the salient features. (7)



B) A simply supported timber beam 100 mm wide and 300 mm deep carries a udl of 'w' kN/m over the entire span of 6 m and a point load 'P' at a distance of 4.5 m from the left support. If the allowable bending stress for timber is 8 MPa, determine 'w' and 'P' that will result in zero shear just to the left of 'P' (6)

Q.3 A) Explain the Mohr's Circle Method for finding out stresses acting on oblique section making an angle with short direction of rectangular body subjected to a direct tensile stress in long direction and direct compressive stress in short direction accompanied by simple shear stress. (4)

B) A concrete cube 150 mm x 150 mm x 150 mm is subjected axial compressive loads of 500 kN and 150 kN on two mutually perpendicular surfaces. Determine the maximum stress induced in the block. (3)

Q4) A) A Hollow circular shaft with diameter ratio 6/7 is required to transmit 350 KW at 150 rpm with a uniform twisting moment. The shearing stress in shaft must not exceed 55 N/mm² and the twist in a length of 3 m must not exceed 1.5°. Calculate the minimum external diameter of the shaft satisfying these conditions. Take the modulus of rigidity $C = 8 \times 10^4$ N/mm² (6)

B) A cylindrical shell 1200 m long 180 mm internal diameter having a thickness of metal 8 mm, is filled with fluid at atmospheric pressure. If an additional 25000 mm³ of fluid is pumped into the cylinder. Find the pressure exerted by the fluid on the cylinder and the hoop stress developed. (4)

Q.5A) A beam having solid circular cross-section of diameter 'D' is subjected to shear force 'S' Obtain the relation for shear stress distribution across the section. Show that maximum shear stress is 33 % more than average shear stress. (6)

B) Using moment area theorems, compute the slope and the deflection at the point C and free end B of the cantilever beam AB of variable moment of inertia, loaded as shown. (6)

