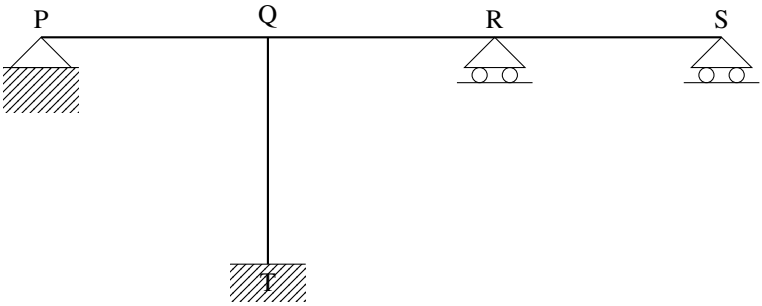
2008-CE- 35-51

EE24BTECH11021 - Eshan Ray

35) The span(s) to be loaded uniformly for maximum positive (*upward*) reaction at support P, as shown in the figure below, is(*are*)



a) PQ only
b) PQ and PR
c) QR and RS
d) PQ and RS

36) A vertical rod PQ of length L is fixed at its top end P and has a flange fixed to the bottom end Q. A weight W is dropped vertically from a height $h\,(<L)$ on to the flange. The axial stress in the rod can be reduced by

a) increasing the length of the rod
b) decreasing the length of the rod
c) decreasing the area of cross-section of the rod
d) increasing the modulus of elasticity of the material

37) Un-factored maximum bending moments at a section of a reinforced concrete beam resulting from a frame analysis are $50, 80, 120\,and\,180\,kNm$ under dead, live, wind and earthquake loads respectively. The design moment (kNm) as per $IS: 456-2000$ for the limit state of collapse($flexure$) is

a) 195
b) 250
c) 345
d) 372

38) A reinforced concrete column contains longitudinal steel equals to 1 percent of net cross-sectional area of the column. Assume modular ratio as 10. The loads carried (*using the elastic theory*) by the longitudinal steel and the net area of concrete, are P_s and P_c respectively. The ratio $\frac{P_s}{P_c}$ expressed as percent is

a) 0.1
b) 1
c) 1.1

d) 10

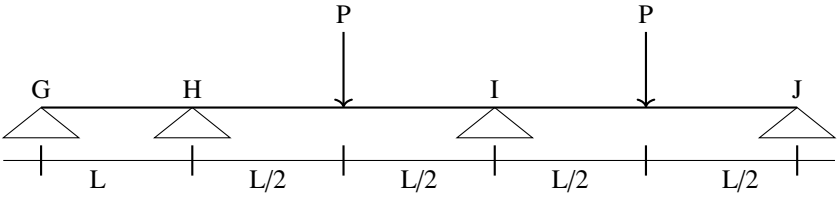
39) A pre-tensioned concrete member of section $200\,mm \times 250\,mm$ contains tendons of area $500\,mm^2$ at centre of gravity of the section. The prestress in the tendons is $1000\,N/mm^2$. Assuming modular ratio as 10, the stress $\left(N/mm^2\right)$ in concrete is

a) 11
b) 9
c) 7
d) 5

40) Rivets and bolts subjected to both shear stress $\left(\tau_{vf,cal}\right)$ and axial tensile stress $\left(\sigma_{tf,cal}\right)$ shall be so proportioned that the stresses don not exceed the respective allowable stresses τ_{vf} and σ_{tf} and the value of $\left(\frac{\tau_{vf,cal}}{\tau_{vf}} + \frac{\sigma_{tf,cal}}{\sigma_{tf}}\right)$ does not exceed

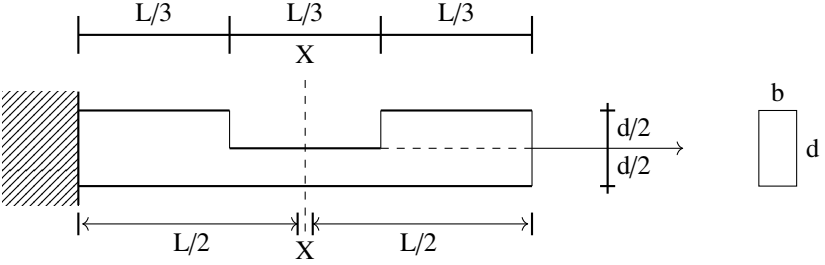
a) 1.0
b) 1.2
c) 1.4
d) 1.8

41) A continuous beam is loaded as shown in the figure below. Assuming a plastic moment capacity equal to M_p, the minimum load at which the beam would collapse is



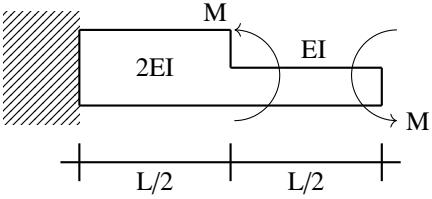
a) $\frac{4M_p}{L}$
b) $\frac{6M_p}{L}$
c) $\frac{8M_p}{L}$
d) $\frac{10M_p}{L}$

42) The maximum tensile stress at the section $X - X$ shown in the figure below is



a) $\frac{8P}{bd}$
b) $\frac{6P}{bd}$
c) $\frac{4P}{bd}$
d) $\frac{2P}{bd}$

43) The stepped cantilever is subjected to moments, M as shown in the figure below. The vertical deflection at the free end(*neglecting the self weight*) is



a) $\frac{ML^2}{8EI}$
b) $\frac{ML^2}{4EI}$
c) $\frac{ML^2}{2EI}$
d) zero

44) The liquid limit (LL), plastic limit (PL) and shrinkage limit (SL) of a cohesive soil satisfy the relation

a) $LL>PL<SL$
b) $LL>PL>SL$
c) $LL<PL<SL$
d) $LL<PL>SL$

45) A footing $2\,m \times 1\,m$ exert a uniform pressure of $150\,kN/m^2$ on the soil. Assuming a load dispersion of 2 vertical to 1 horizontal, the average vertical stress $\left(kN/m^2\right)$ at $1.0\,m$ below the footing is

a) 50
b) 75
c) 80
d) 100

46) A direct shear test was conducted on a cohesionless soil ($c = 0$) specimen under a normal stress of $200\,kN/m^2$. The specimen failed at a shear stress of $100\,kN/m^2$. The angle of internal friction of the soil (*degrees*) is

a) 26.6
b) 29.5
c) 30.0
d) 32.6

47) A pile of $0.50\,m$ diameter and of length $10\,m$ is embedded in a deposit of clay. The undrained strength parameters of the clay are cohesion = $60\,kN/m^2$ and the angle of internal friction = 0. The skin friction capacity (kN) of the pile for an adhesion factor of 0.6, is

a) 671
b) 565
c) 283
d) 106

48) A saturated clay stratum draining both at the top and bottom undergoes 50 percent consolidation in 16 years under an applied load. If an additional drainage layer were

present at the middle of the clay stratum, 50 percent consolidation would occur in

a) 2 years
b) 4 years
c) 8 years
d) 16 years

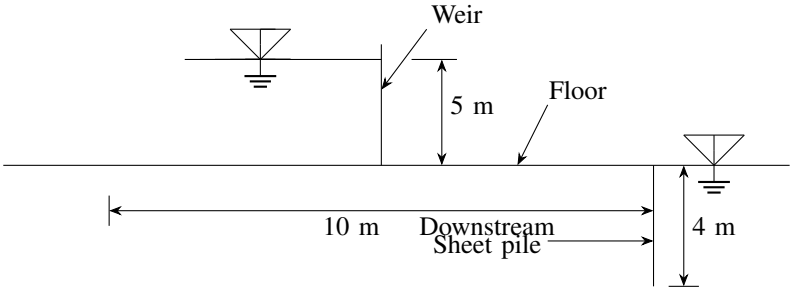
49) A test plate $30\,cm \times 30\,cm$ resting on a sand deposit settles by $10\,mm$ under a certain loading intensity. A footing $150\,cm \times 200\,cm$ resting on the same sand deposit and loaded to the same load intensity settles by

a) $2.0\,mm$
b) $27.8\,mm$
c) $30.2\,mm$
d) $50.0\,mm$

50) A volume of $3.0 \times 10^6\,m^3$ of groundwater was pumped out from an unconfined aquifer uniformly from an area of $5\,km^2$. The pumping lowered the water table from initial level of $102\,m$ to $99\,m$. The specific yield of the aquifer is

a) 0.20
b) 0.30
c) 0.40
d) 0.50

51) A weir on a permeable foundation with downstream sheet pile is shown in the figure below. The exit gradient as per Khosla's method is



a) $1\,in\,6.0$
b) $1\,in\,5.0$
c) $1\,in\,3.4$
d) $1\,in\,2.5$