Answer-key & Solution

SSC JE (SOM)
Date 19.08.2017

1. B	13. D	25. D	37. B	49. C	61. C	73. B	85. D
2. C	14. C	26. A	38. D	50. D	62. B	74. D	86. D
3. D	15. C	27. B	39. B	51. B	63. C	75. B	87. A
4. D	16. D	28. C	40. A	52. C	64. B	76. D	88. C
5. D	17. C	29. B	41. A	53. D	65. D	77. B	89. A
6. B	18. B	30. C	42. A	54. A	66. A	78. A	90. A
7. A	19. A	31. B	43. D	55. A	67. B	79. A	
8. D	20. B	32. C	44. A	56. C	68. A	80. A	
9. C	21. C	33. B	45. D	57. C	69. A	81. B	
10. C	22. D	34. C	46. D	58. C	70. A	82. A	
11. B	23. A	35. D	47. D	59. C	71. C	83. A	
12. A	24. B	36. B	48. A	60. D	72. D	84. D	

Note : *If your opinion differ regarding any answer, please message the mock test and Question number to 9560620353*

Note : *If you face any problem regarding result or marks scored, please contact : 9313111777*

SOLUTION

3.(D) $E_1 = E_2$

$$\left[\left(\frac{P}{A}\right)\frac{L}{\delta L}\right]_1 = \left[\frac{P}{A}\frac{L}{\delta L}\right]_2$$

$$\frac{d_1^2\delta L_1}{L_1} = \frac{d_2^2\delta L_2}{L_2}$$

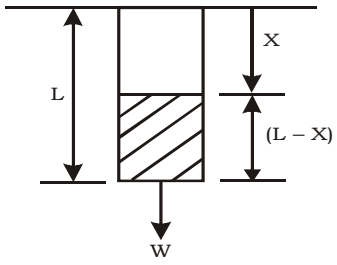
$$\frac{r_1^2\delta L_1}{L_1} = \frac{r_2^2\delta L_2}{L_2}$$

$$\frac{r_1^2\delta L_1}{L_1} = \frac{r_1^2}{4}\frac{\delta L_2}{2L_1}$$

$$\delta L_2 = 8\delta L_1$$

$$\delta L_2 = 16mm$$

6.(B)

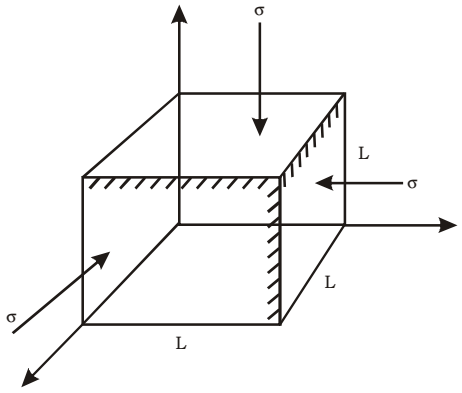


Tension force = W + Weight of (L – X) length part

= W + w (L – X)

F = W + w (L – X)

11.(B)



In x-direction-

δL_x = 0 = (free expansion) – (contraction due to σ)

$$0 = \alpha LT - \left[\frac{\sigma L}{E} - \frac{\mu\sigma L}{E} - \frac{\mu\sigma L}{E}\right]$$

$$\alpha T = \frac{\sigma}{E}(1-2\mu)$$

$$\sigma = \frac{E\alpha T}{1-2\mu}$$

Similar in Y and Z direction

$$\sigma_x = \sigma_y = \sigma_z = \sigma = \frac{E\alpha T}{1-2\mu}$$

17.(C) $\sigma_{max} = 2\sigma_{min}$

$$\tau_{max} = \frac{\sigma_{max} - \sigma_{min}}{2}$$

$$= \frac{\sigma_{max} - \frac{\sigma_{max}}{2}}{2}$$

$$\tau_{max} = \frac{\sigma_{max}}{4}$$

$$\sigma_{max} = 4\tau_{max}$$

19.(A) $\varepsilon_{max} = 100\times10^{-6}$

$$\varepsilon_{min} = -200\times10^{-6}$$

$$\frac{\gamma_{max}}{2} = \frac{\varepsilon_{max} - \varepsilon_{min}}{2}$$

$$\gamma_{max} = [100 - (-200)]\times10^{-6}$$

$$\gamma_{max} = 300\times10^{-6}$$

26.(A) $M(x) = Ax - Bx^2$

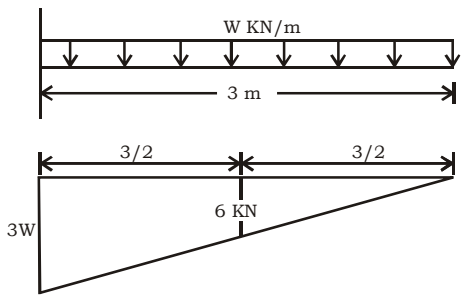
$$V = \frac{dM}{dx} = A - 2Bx$$

V = 0

A – 2B x = 0

$$x = \frac{A}{2B}$$

28.(C)

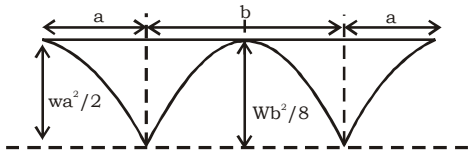


From similar trangle

$$\frac{3W}{3} = \frac{6}{3/2}$$

W = 4 KN

30.(C)



B . M at mid span = 0

$$\frac{wb^2}{8} - \frac{wa^2}{2} = 0$$

$b^2 = 4a^2$

$b = 2a$

$$\frac{a}{b} = \frac{1}{2}$$

34.(C) F = 20 KN

$$\tau_{avg} = \frac{F}{A} = \frac{F}{bd}$$

$$\tau_{avg} = \frac{20KN}{10 \times 5} = \frac{2}{5}\frac{KN}{cm^2}$$

$$\tau_{\max} = \frac{3}{2}\tau_{avg}$$

$$\tau_{\max} = 600N/cm^2$$

40. $\delta = \frac{WL^3}{48EI}$

$$\delta \alpha \frac{1}{I}$$

$$\delta \alpha \frac{1}{d^3}$$

$$\frac{\delta_2}{\delta_1} = \left(\frac{d_1}{d_2}\right)^3 = \left(\frac{1}{2}\right)^3$$

$$\delta_2 = \frac{\delta_1}{8}$$

43.(D) For A

$$\theta_A = \frac{ML}{EI} = \frac{\frac{WL}{2}L}{EI}$$

$$\theta_A = \frac{WL^2}{2EI} \qquad \ldots(i)$$

For B

$$\theta_B = \frac{WL^2}{2EI} \qquad \ldots(ii)$$

For equation (i) and (ii)

$\theta_A = \theta_B$

55.(A) $M_{eq} = \frac{1}{2}\left[M + \sqrt{M^2 + T^2}\right]$

$$= \frac{1}{2}\left[400 + \sqrt{400^2 + 300^2}\right]$$

M_{eq} = 450 Nm

$T_{eq} = \sqrt{M^2 + T^2} = \sqrt{400^2 + 300^2}$

T_{eq} = 500 Nm

58.(C) L = 240cm

A = 20 cm^2

I_{xx} = 720 cm^4

I_{yy} = 80 cm^4

$I_{min} = I_{yy} = 80 = A\ K^2_{min}$

$80 = 20\ K^2_{min}$

K_{min} = 2cm, L = 240cm

Slenderness ratio = $\frac{L}{K_{min}} = 120$

60.(D) $P_C = \frac{\pi^2 EI}{L_e^2}$

$$(P_C)_1 = \frac{\pi^2 EI}{4L^2}$$

$$40 = \frac{\pi^2 EI}{L^2}$$

and $(P_C)_2 = 4\frac{\pi^2 EI}{L^2}$

$$(P_C)_2 = 4 \times 40$$

$$(P_C)_2 = 160KN$$