ANSWERS

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

EXPLANATIONS

1. Given matrix $[A] = \begin{bmatrix} 4 & 2 & 1 & 3 \\ 6 & 3 & 4 & 7 \\ 2 & 1 & 0 & 1 \end{bmatrix}$

Eliminating first column and expanding the determinant of the given matrix, we have

$$|A| = \begin{vmatrix} 4 & 2 & 1 & 3 \\ 6 & 3 & 4 & 7 \\ 2 & 1 & 0 & 1 \end{vmatrix} = 0$$

Therefore $r(A)$ is less than 3.

We observe that $\begin{bmatrix} 4 & 7 \\ 0 & 1 \end{bmatrix}$ is a non-singular square sub-matrix of order 2.

Hence $r(A) = 2$.

By definition, the rank of a matrix is of the highest order non-singular square submatrix.

3. The general equation of a plane passing through three points will be

$$a(x - x_1) + b(y - y_1) + c(z - z_1) = 0$$

Since it passing through (0, 0, 0), therefore equation becomes,

$$ax + by + cz = 0 \quad ...(i)$$

Again it is passes through, (1, 3, 4) and (2, 1, – 2), therefore

$$a + 3b + 4c = 0$$

and $$2a + b - 2c = 0$$

By cross multiplication, we get

$$\frac{a}{-6-4} = \frac{b}{+8+2} = \frac{c}{+1-6} = \lambda \text{ (say)}$$

$\therefore$
$$a = -10\lambda$$
$$b = +10\lambda$$
$$c = -5\lambda$$

Putting these values in equation (i), we get

$$-10\lambda x + 10\lambda y - 5\lambda z = 0$$

or $$-10x + 10y - 5z = 0$$

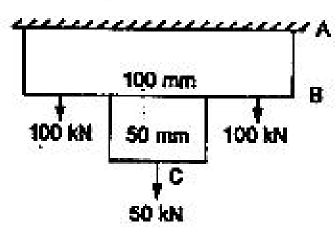
or $$10x - 10y + 5z = 0$$

or $$2x - 2y + z = 0$$

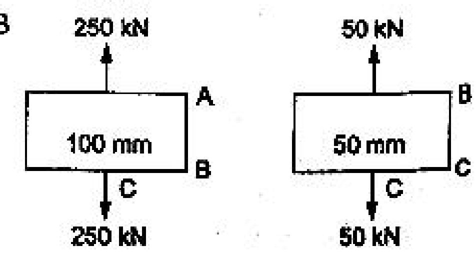
Perpendicular distance of this plane from point (3, –2, –1) will be,

$$\left|\frac{6+4-1}{\sqrt{4+4+1}}\right| = \left|\frac{9}{3}\right| = 3$$

4.



F.B.D. of AB



Hence stress in AB $= \frac{250 \times 10^3}{100 \times 100} = 25 \text{ N/mm}^2$

and stress in BC $= \frac{50 \times 10^3}{50 \times 50} = 20 \text{ N/mm}^2$

$\therefore$ Maximum tensile stress $= 25 \text{ N/mm}^2$