

7.1

$$(i) (i) 4! = 4 \times 3 \times 2 \times 1 = 24$$

$$(ii) 6! = 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720$$

$$(iii) \frac{8!}{7!} = \frac{8 \times \cancel{7} \times \cancel{6} \times \cancel{5} \times \cancel{4} \times \cancel{3} \times \cancel{2} \times 1}{\cancel{7} \times \cancel{6} \times \cancel{5} \times \cancel{4} \times \cancel{3} \times \cancel{2} \times 1} = 8.$$

$$(iv) \frac{8!}{7!} = \frac{8 \times \cancel{7!}}{\cancel{7!}} = 8.$$

$$(v) \frac{10!}{7!} = \frac{10 \times \cancel{9} \times \cancel{8} \times \cancel{7!}}{\cancel{7!}} = 720.$$

$$(vi) \frac{6!}{3!3!} = \frac{6 \times 5 \times \cancel{4} \times \cancel{3!}}{\cancel{3!} \cancel{3!}} = \frac{120}{6} = 20.$$

$$(vii) \frac{11!}{4!7!} = \frac{11 \times 10 \times 9 \times \cancel{8} \times \cancel{7!}}{\cancel{4!} \times \cancel{7!}} = 330.$$

$$(viii) \frac{8!}{4!2!} = \frac{8 \times 7 \times 6 \times 5 \times \cancel{4!}}{\cancel{4!} \times 2!} = 840.$$

$$(ix) \frac{11!}{2!4!5!} = \frac{11 \times 10 \times 9 \times 8 \times 7 \times 6 \times \cancel{5!}}{\cancel{2!} \times \cancel{4!} \times \cancel{5!}} = \frac{332640}{48} = 6930.$$

$$(x) \frac{9!}{2!(9-2)!} = \frac{9!}{2!7!} = \frac{9 \times 8 \times \cancel{7!}}{\cancel{2!} \times \cancel{7!}} = \frac{72}{2} = 36.$$

$$(xi) \frac{15!}{15!(15-15)!} = \frac{\cancel{15!}}{\cancel{15!} (0!)} = \frac{1}{0!} = \frac{1}{1} = 1. \quad \left[\because 0! = 1 \right]$$

$$(xi) \frac{3!}{0!} = \frac{3 \times 2 \times 1}{1} = 6.$$

$$(xii) 4! \times 0! \times 1! = (4 \times 3 \times 2 \times 1)(1)(1) = 24.$$

$$(Q2) (i) \frac{6 \cdot 5 \cdot 4 \times 3!}{3!} \quad \left[\text{Multiply and divide by } 3! \right]$$

$$= \frac{6!}{3!}$$

$$(ii) = 12 \cdot 11 \cdot 10 \quad (\text{multiply and divide by } 9!)$$

$$= \frac{12 \cdot 11 \cdot 10 \cdot 9!}{9!} = \frac{12!}{9!}$$

$$(iii) = \frac{20 \cdot 19 \cdot 18 \cdot 17 \cdot 16!}{16!} \quad \left[\text{Multiply and divide by } 16! \right]$$

$$= \frac{20!}{16!}$$

$$(iv) = \frac{10 \cdot 9}{2!} \quad \left[\text{Multiply and divide by } 8! \right]$$

$$= \frac{10 \cdot 9 \cdot 8!}{2! \times 8!} = \frac{10!}{2! 8!}$$

$$(v) \frac{8 \cdot 7 \cdot 6}{3 \cdot 2 \cdot 1} \quad \left[\text{multiply and divide by } 5! \right]$$

$$= \frac{8 \cdot 7 \cdot 6 \cdot 5!}{3! \cdot 5!} = \frac{8!}{3! 5!}$$

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(vi) $\frac{52 \cdot 51 \cdot 50 \cdot 49}{4 \cdot 3 \cdot 2 \cdot 1}$

$$= \frac{52 \cdot 51 \cdot 50 \cdot 49 \cdot 48!}{4 \cdot 3 \cdot 2 \cdot 1 \cdot 48!} \quad \left[\text{Multiply and divide by } 48! \right]$$

$$= \frac{521}{41481}$$

(vii) $n(n-1)(n-2)$ [Multiply and divide by $(n-3)!$]

$$= \frac{n(n-1)(n-2)(n-3)!}{(n-3)!}$$

$$= \frac{n!}{(n-3)!}$$

(viii) $(n+2)(n+1)(n)$

$$= \frac{(n+2)(n+1)(n)(n-1)!}{(n-1)!} \quad \left[\text{Multiply and divide by } (n-1)! \right]$$

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$$= \frac{(n+2)!}{(n-1)!}$$

(ix) $\frac{(n-1)(n)(n-1)(n-2)!}{3 \cdot 2 \cdot 1 (n-2)!} = \frac{(n+1)!}{3! (n-2)!} \quad \left[\text{Multiply and divide by } (n-2)! \right]$

$$(x) \quad n(n-1)(n-2) \dots (n-r+1)$$

As we see the numbers are decreasing by 1. Thus the next number would be:-

$$\therefore (n-r+r) = n-r.$$

$$= \frac{n(n-1)(n-2) \dots (n-r+1)(n-r)!}{(n-r)!} \quad \left\{ \begin{array}{l} \text{Multiply and divide} \\ \text{by } (n-r)! \end{array} \right.$$

$$= \frac{n!}{(n-r)!}$$

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