CHAPTER – 19

TRIGONOMETRIC TABLES

Exercise – 19.1

1. Find the value of the following:

(i) $\sin 35°22'$

Solution:

To find the value of $\sin 35°22'$

We read the table of natural sines in the horizontal line which begins with 35°

In the vertical column headed by 22’ i.e. 22’ – 18’ = 4’ in the difference column, the value of 4’ in mean difference column is 10.

Then, value that we find in vertical column is 0.5779

Now adding the value of 18’ and 4’ = 0.5779 + 10 = 0.5789

Therefore, the value of $\sin 35°22'$ is obtained as under,

$\sin 35°22' = 0.5779$ … [From table]

Mean difference for 4’ = 10 …. [To be added]

Then, $\sin 35°22' = 0.5789$

(ii) $\sin 71°31'$

Solution:

To find the value of $\sin 71°31'$

We read the table of natural sines in the horizontal line which begins with 35°

In the vertical column headed by 31’ i.e. 31’ – 30’ = 1’ in the difference column, the value of 1’ in mean difference column is 1.

Then, value that we find vertical column is 0.9483

Now adding the value of 30’ and 1’ = 0.9483 + 1

= 0.9484

Therefore, the value of $\sin 71°31'$ is obtained as under,

$\sin 71°31' = 0.9483$ … [From table]

Means difference for 1’ = 1 …. [To be added]

Then, $\sin 71°31' = 0.9484$

(iii) $\sin 65°20'$

Solution:

To find the value of $\sin 65°20'$

We read the table of natural sines in the horizontal line which begins with 35°

In the vertical column headed by 20’ i.e. 20’ – 18’ = 2’ in the difference column, the value of 2’ in mean difference column is 2.

Then, value that we find in vertical column is 0.9085

Now adding the value of 18’ and 2’ = 0.9085 + 2

= 0.9087

Therefore, the value of $\sin 65°20'$ is obtained as under,

$\sin 65°20' = 0.0985$ … [From table]

Mean difference for 2’= 2 … [To be added]

Then, $\sin 65°20' = 0.0987$

(iv) $\sin 23°56'$

Solution:

To find the value of $\sin 23°56'$

We read the table of natural sines in the horizontal line which begins with 23°

In the vertical column headed by 56' i.e. 56' – 54' = 2' in the difference column, the value of 2' in mean difference column is 5.

Then, value that we find vertical column is 0.4051

Now adding the value of 54' and 4' = 0.4051 + 5

= 0.4056

Therefore, the value of $\sin 23°56'$ is obtained as under,

$\sin 23°56' = 0.4051$ … [From table]

Means difference for 2' = 5 …. [To be added]

Then, $\sin 23°56' = 0.4056$

2. Find the value of the following:

(i) $\cos 62°27'$

Solution:

We know that as θ increase, the value of $\cos\theta$ decrease, therefore, the numbers in the mean difference columns are to be subtracted.

To fine the value of $\cos 62°27'$

We read the table of natural sines in the horizontal line which begins with 62°

In the vertical column headed by 27’ i.e. 27’ – 24’ = 3’ in the difference column, the value of 3’ in means difference column is 8.

Then, value that we find in vertical column is 0.4633

Now, adding the value of 24’ and 3’ = 0.4633 – 8

= 0.4625

Therefore, $\cos 62°27'$ is 0.4625?

(ii) $\cos 3°11'$

Solution:

We know that as θ increase, the value of $\cos\theta$ decrease, therefore, the numbers in the mean difference columns are to be subtracted.

To fine the value of $\cos 3°11'$

We read the table of natural sines in the horizontal line which begins with 3°

In the vertical column headed by 27’ i.e. 11’ – 6’ = 5’ in the difference column, the value of 5’ in means difference column is 1.

Then, value that we find in vertical column is 0.9985

Now, adding the value of 6’ and 5’ = 0.9985 – 1

= 0.9984

Therefore, $\cos 3°11'$ is 0.9984

(iii) $\cos 86°40'$

Solution:

We know that as θ increase, the value of $\cos\theta$ decrease, therefore, the numbers in the mean difference columns are to be subtracted.

To fine the value of $\cos 86°40'$

We read the table of natural sines in the horizontal line which begins with 86°

In the vertical column headed by 40' i.e. 40' – 36' = 4' in the difference column, the value of 4' in means difference column is 12.

Then, value that we find in vertical column is 0.0593

Now, adding the value of 6' and 5' = 0.0.593 – 12

= 0.0581

Therefore, $\cos 86°40'$ is 0.0581?

(iv) $\cos 45°58'$

Solution:

We know that as θ increase, the value of $\cos\theta$ decrease, therefore, the numbers in the mean difference columns are to be subtracted.

To fine the value of $\cos 45°58'$

We read the table of natural sines in the horizontal line which begins with 45°

In the vertical column headed by 58' i.e. 58' – 54' = 4' in the difference column, the value of 4' in means difference column is 8.

Then, value that we find in vertical column is 0.6959

Now, adding the value of 54' and 4' = 0.6959 – 8

= 0.6951

Therefore, $\cos 45°58'$ is 0.6951?

3. Find the value of the following:

(i) $\tan 15°2'$

Solution:

To find the value of $\tan 15°2'$

We read the table of natural sines in the horizontal line which begins with 15°

In the vertical column headed by 2', the value of 2' in means difference column is 6.

Then, value that we find in vertical column is 0.2679

Now adding the values = 0.2685 + 6

= 0.2685

Therefore, $\tan 15°2'$ is 0.685

(ii) $\tan 53°14'$

Solution:

To find the value of $\tan 53°14'$

We read the table of natural sines in the horizontal line which begins with 53°

In the vertical column headed by 14' i.e. 14' – 12' = 2' in the difference column, the value of 2' in mean difference column is 16.

Then, value that we find in vertical column is 1.3367

Now adding the value of 12' and 2' = 1.3367 + 16

$$= 1.3383$$

Therefore, $\tan 53°14'$ is 1.3383.

(iii) $\tan 82°18'$

Solution:

To find the value of $\tan 82°18'$

We read the table of natural sines in the horizontal line which begins with 82°

Then, value that we find in vertical column is 7.3962

Therefore, $\tan 82°18'$ is 7.3962?

(iv) $\tan 6°9'$

Solution:

To find the value of $\tan 6°9'$

We read the table of natural sines in the horizontal line which begins with 6°

In the vertical column headed by 9' i.e. 9' – 6' = 3' in the difference column, the value of 3' in mean difference column is 9.

Then, value that we find in vertical column is 0.1069

Now adding the value of 6' and 3' = 0.1069 + 9

$$= 0.1078$$

Therefore, $\tan 6°9'$ is 0.1078

4. Use tables to find the acute angle θ, given that:

(i) $\boldsymbol{\sin\theta = .5789}$

Solution:

In the table of natural sines, look for a value $(\leq .5789)$ which is sufficiently close to .5789.

We find the value .5779 occurs in the horizontal line beginning with 35° and in the column headed by 18' and in the mean difference, we see .5789 - .5779 = .0010 in the column of 4'

So we get, $\theta = 35°18' + 4' = 35°22'$

(ii) $\boldsymbol{\sin\theta = .9484}$

Solution:

In the table of natural sines, look for a value $(\leq .9484)$ which is sufficiently close to .9484.

We find the value .9484 occurs in the horizontal line beginning with 71° and in the column headed by 30' and in the mean difference, we see .9484 – .9483 = .0001 in the column of 1'

So we get, $\theta = 71°30' + 4' = 71°31'$

(iii) $\boldsymbol{\sin\theta = .2357}$

Solution:

In the table of natural sines, look for a value $(\leq .2357)$ which is sufficiently close to .2351.

We find the value .9484 occurs in the horizontal line beginning with 13° and in the column headed by 36' and in the mean difference, we see .2357 – .2351 = .0006 in the column of 2'

So we get, $\theta = 13°36' + 2' = 13°38'$

(iv) $\boldsymbol{\sin\theta = .6371}$

Solution:

In the table of natural sines, look for a value $(\leq .6371)$ which is sufficiently close to .6371.

We find the value .6371 occurs in the horizontal line beginning with 39° and in the column headed by 30' and in the mean difference, we see .6371 – .6361 = .0010 in the column of 4'

So we get, $\theta = 39°30' + 4' = 39°34'$

5. Use tables to find the acute angle θ, given that:

(i) $\boldsymbol{\cos\theta = .4625}$

Solution:

In the table of cosines, look for a value $(\leq .4625)$ which is sufficiently close to .4625.

We find the value .4617 occurs in the horizontal line beginning with 62° and in the column headed by 30' and in the mean difference, we see .4625 – .4617 = .0008 in the column of 3'

So we get, $\theta = 62°30' - 3' = 62°\ 27'$

(ii) $\boldsymbol{\cos\theta = .9906}$

Solution:

In the table of cosines, look for a value $(\leq .9906)$ which is sufficiently close to .9906.

We find the value .9905 occurs in the horizontal line beginning with 7° and in the column headed by 54' and in the mean difference, we see .9906 – .9905 = .0001 in the column of 3'

So we get, $\theta = 70°54' - 3' = 70°\ 51'$

(iii) $\boldsymbol{\cos\theta = .6951}$

Solution:

In the table of cosines, look for a value $(\leq .6951)$ which is sufficiently close to .6951.

We find the value .6947 occurs in the horizontal line beginning with 46° and in the mean difference, we see .6951 – .6947 = .0004 in the column of 2'

So we get, $\theta = 46°' - 2' = 45°\ 58'$

(iv) $\boldsymbol{\cos\theta = .3412}$

Solution:

In the table of cosines, look for a value $(\leq .3412)$ which is sufficiently close to .3412.

We find the value .3404 occurs in the horizontal line beginning with 70° and in the column headed by 6' and in the mean difference, we see .3412 – .3404 = .0008 in the column of 3'

So we get, $\theta = 70°6' - 3' = 70°\ 3'$

6. Use tables to find the acute angle θ, given that:

(i) $\boldsymbol{\tan\theta = .2685}$

Solution:

In the table of natural tangent, look for a value $(\leq .2685)$ which is sufficiently close to .2685.

We find the value .2679 occurs in the horizontal line beginning with 15° and in the mean difference, we see .2685 – .2679 = .0006 in the column of 2'.

So we get, $\theta = 15° + 2' = 15°2'$

(ii) $\boldsymbol{\tan\theta = 1.7451}$

Solution:

In the table of natural tangent, look for a value (≤ 1.7451) which is sufficiently close to 1.7451.

We find the value 1.7451 occurs in the horizontal line beginning with 60° and in the column headed by 6' and in the mean difference, we see 1.7451 – 1.7391 = .0060 in the column of 5'.

So we get, $\theta = 60°6' + 5' = 60°11'$

(iii) $\boldsymbol{\tan\theta = 3.1749}$

Solution:

In the table of natural tangent, look for a value (≤ 3.1749) which is sufficiently close to 3.1749.

We find the value 3.1716 occurs in the horizontal line beginning with 72° and in the column headed by 30' and in the mean difference, we see 3.1749 – 3.1716 = .0033 in the column of 1'.

So we get, $\theta = 72°30' + 1' = 72°31'$

(iv) $\boldsymbol{\tan\theta = .9347}$

Solution:

In the table of natural tangent, look for a value $(\leq .9347)$ which is sufficiently close to .9347.

We find the value .9325 occurs in the horizontal line beginning with 43° and in the mean difference, we see .9347 – .9325 = .0022 in the column of 4'.

So we get, $\theta = 43° + 4' = 43°4'$

7. Using trigonometric table, find the measure of the angle A when $\sin A = 0.1822$

Solution:

In the table of natural sines, look for a value (≤ 0.1822) which is sufficiently close to 0.1822

We find the value 0.1822 occurs in the horizontal line beginning with 10° and in the column headed by 30'

So we get, A = 10°30'.

8. Using tables, find the value of $2\sin\theta - \cos\theta$ When (i) $\theta = 35°$ (ii) $\tan\theta = .2679$.

Solution:

(i) We have to find the value of $2\sin\theta - \cos\theta$

From the question it is given that, value of $\theta = 35°$

So, substitute the value of θ,

$= 2\sin 35° - \cos 35°$

From the table value of $\sin 35° = .5736$ and $\cos 35° = .8192$

$= (2 \times .5736) - .8192$

$= 0.3280$

(ii) From the question it is given that, $\tan\theta = .2679$

In the table of natural sines, look for a value $(\leq .2679)$ which is sufficiently close to .2679.

We find the value column headed by $15°$

So we get, $\theta = 15°$

So, substitute the value of θ,

$= 2\sin 15° - \cos 15°$

From the table value of $\sin 15° = .2588$ and $\cos 15° = .9659$

$= (2 \times .2588) - .9659$

$= -0.4483$

9. If $\sin x° = 0.67$, find the value of (i) $\cos x°$ (ii) $\cos x° + \tan x°$

Solution:

From the question it is given that, $\sin x° = 0.67$.

In the table of natural sines, look for a value (≤ 0.67) which is sufficiently close to 0.67.

We find the value 0.6691 occurs in the horizontal line beginning with 42° and in the means difference, we see 0.6700 – 0.6691 = .0009 in the column of 4'

So we get, $\theta = 42° + 4' = 42°4'$

Then,

(i) $\cos x°$

From the table

$= .7431 - .0008$

$= 0.7423$

(ii) $\cos x° + \tan x° = \cos 42°4' + \tan 42° 4'$

$= 0.7423 + .9025$

$= 1.6448$

10. If θ is acute and $\cos\theta = .7258$, find the value of (i) θ (ii) $2\tan\theta - \sin\theta$.

Solution:

From the question, $\cos\theta = .7258$

In the table of cosines, look for a value $(\leq .7258)$ which is sufficiently close to .7258.

We find the value .7254 occurs in the horizontal line beginning with 43° and in the column headed by 30' and in the mean difference, we see .7258 – .7254 = .0004 in the column of 2'

So we get, $\theta = 43°30' - 2' = 43°28'$

(i) $\theta = 43°30' - 2'$

$= 43°28'$

(ii) $2\tan\theta - \sin\theta$

Substitute the value θ,

$= 2\tan 43°28' - \sin 43°28'$

$= 2(.9479) - .6879$

$= 1.8958 - .6879$

$= 1.2079$

Therefore, the value of $2 \tan \theta - \sin \theta$ is 1.2079.