Indian Calendars

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1. Introduction

A calendar is a method of counting the successive days in a systematic and continuous manner using convenient, repeated cycles called years. The measure of the year is calculated by studying the motion of the two prominent luminaries in the sky, namely the sun and the moon. The return of the sun to the same reference point in its path in the sky is the measure of the solar year and the basis of all solar calendars. However, this reference point maybe chosen in two different ways. These are called the sidereal and tropical systems. These have been explained in detail in subsequent sections.

The time period of the successive return of the moon in conjunction or opposition to the sun in relation to the earth, which is the time period from new moon to new moon, or full moon to full moon, is the measure of the lunar month, and twelve such months form the lunar year.

The lunar year is shorter than the solar year by about 11 days. So the Indian lunar calendar is kept adjusted to the solar calendar and therefore to the seasons by the addition of an intercalary moth at suitable intervals. Such a calendar is called a luni-solar calendar. The Indian calendaric system comprises of both solar and luni-solar calendars.

2. Astronomical Background

There are two prominent motions exhibited by earth – rotation and revolution. The rotation of the earth is what causes the transitions of days and nights. The revolution of the earth around the sun causes the succession of years. The axis of rotation is inclined to the plane of revolution by about 23°26'. This is reflected in the ecliptic[1] being inclined to the celestial sphere[2] by the same angle. The ecliptic intersects the celestial equator at two points which are opposite to each other. These points are called equinoctial points because it is when the earth is at these points the equinoxes occur.

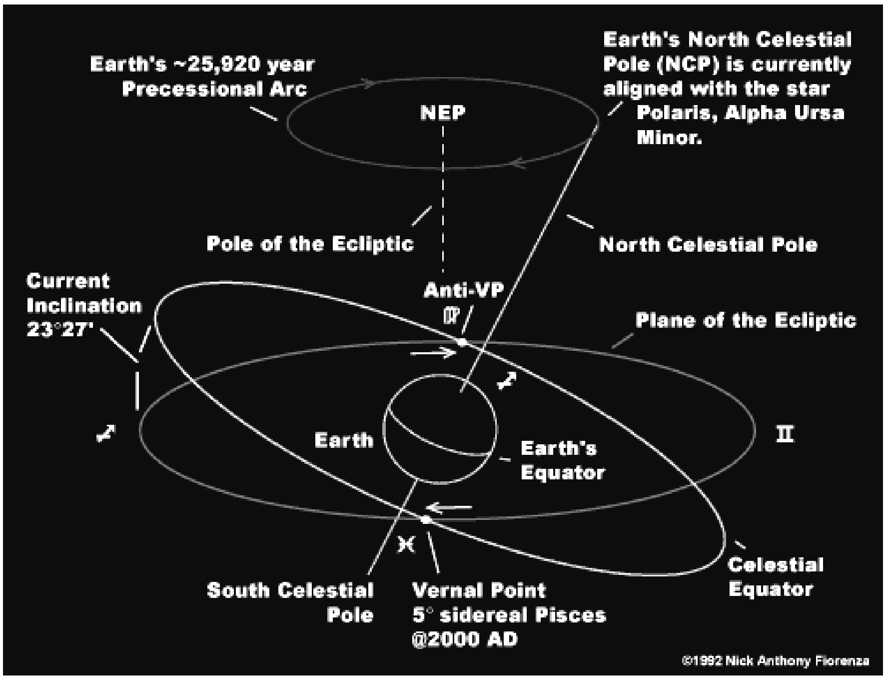
An equinox is a point where the sun crosses the equator from one hemisphere to the other. When the sun crosses over from south to north it is called the vernal or spring equinox. This equinox is also referred to as the March equinox as it usually occurs on or around the 21st of March. The other equinox when the sun crosses over from north to south is called the autumnal equinox or September equinox as it occurs on or around the 23rd of September.

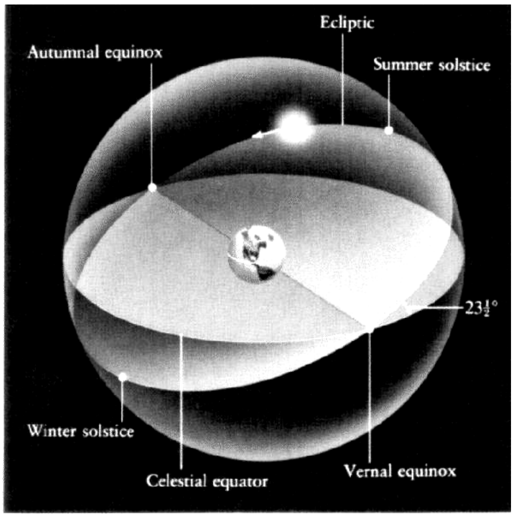
The earth apart from having the well known motions of rotation and revolution exhibits another motion called the **precessional motion**. Due to the forces of attraction of the sun and the moon, the above stated axis of rotation makes a very slow conical motion around the pole of the orbit about the sun, which is the same as the pole of the ecliptic. This motion occurs in the anti-clockwise direction but it maintains the same inclination as its orbital plane. So, in other words, the earth's axis describes a cone of semi-vertical angle of 23°26', this causes the celestial pole to make a circle around the ecliptic pole. The rate of this motion at present is about 50".3 in celestial longitude, and thus it takes about 25,800 years for the celestial pole to make a circle around the ecliptic pole. The direction of the earth's axis is therefore not fixed in space, and is at present pointing towards the star Polaris or also known as 'Dhruba Tara' in the Indian language. At about 4000AD or so, the celestial pole will move to the position of ? Cepheus.

[1]Ecliptic – The path of the motion of the sun around the earth, if the earth was kept fixed and the sun assumed to be in movement around it.
[2]Celestial Sphere - It is useful in discussing objects in the sky to imagine them to be attached to a sphere surrounding the earth. This fictitious construction is called the *celestial sphere*.

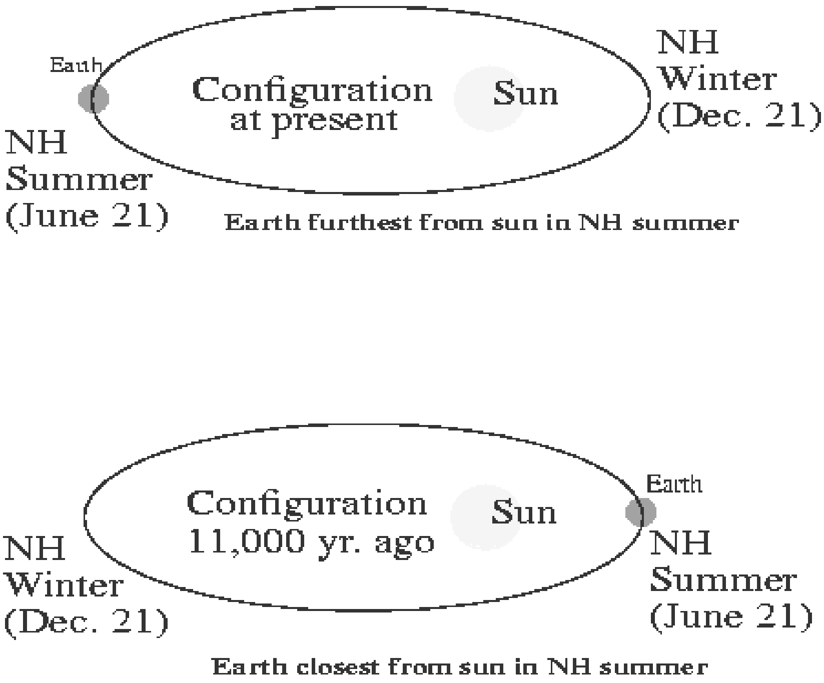
The precessional motion of the earth causes the two intersection points of the ecliptic with the celestial equator, which are the equinoxes or equinoctial points, to slide westwards on the ecliptic at a rate of 50”.3 per year. This is known as the precession of the equinoxes.

This phenomenon plays a very important role in calendar making and is the cause of the diffe rence in the sidereal and tropical calendars.





The Precession of the Equinoxes (seasons)



Objects not to scale; Orbit exaggerated

[After figure 16 from Imbrie and Imbrie, 1979, ISBN 0-674-44075-7]

3. Solar Calendar

The solar year is the time period of the earth's revolution around the sun. If instead of taking the sun as a fixed body, we assume the earth to be fixed, then the sun will seem to be moving around the earth. Therefore, the time taken for the sun to make a complete revolution of the earth and come back to the same reference point in the sky will be the measure of a year. This apparent annual path of the sun around the earth is called the '**ecliptic**'.

The reference point to which the sun returns every year is fixed in two different ways, which yields different results for the length of the year.

1. A fixed point on the ecliptic with reference to a background star– **sidereal** or **nirayana system**
2. Any of the two equinoxes or equinoctial points, which for calendarical and astronomical purposes is normally taken to be the vernal or March equinoctial points – **tropical** or **sayana system**.

In the sidereal system the star which is seen just before the sun rises, at the position where the sun rises on the day of the equinox is taken to be the reference point in the sky for the sun to return to. This marks the completion of a year.

The other system is called the tropical or sayana system. A fixed point which is the equinoctial point is taken as reference point for the sun to return to.

Due to the precessional motion of the earth, under the tropical system the distance that the sun has to travel is reduced to 360°-50".3 every year. And therefore the length of the tropical year is less by about 20min 24.5sec to that of the sidereal year.

In the tropical Gregorian calendar, to compensate for this 0.24219 day which if left over after counting the normal years to 365 days, a leap year of 366 days occurs at every Gregorian era divisible by four. If this is followed then there will be too many leap years. So, only those century years which are divisible by 400 are taken to be leap years. Therefore, there are 97 leap years in a period of 400 years.

In a nirayana or sidereal year calendar when the months have a fixed number of days and a normal year has 365 days, to compensate for the left over period of 0.256363 day, there will be continuous leap years, including century years, at intervals of four years, also there will be additional leap years added mathematically added at intervals of 157 years, this can be rounded off to 160 years. This rounding up is probably so that these leap years will not coincide with the usual leap years that are added every four years. If we take a scenario where 4AD was taken to be a leap year, also 2AD was a specially added leap year. If we were to follow a 157 year interval, in the third cycle we get a sum of 316 which is divisible by 4. So now the question is does this leap year contain two leap days? However, if we follow a 160 year cycle, we do not run into the problem.

An alternative method to all of the above would be to add 10 leap years in each cycle of 39 years.

In India the sidereal or nirayana system is followed by the traditional calendar. It follows the calendaric principles laid down in the ancient astronomical treatise named as Surya Siddhanta. The fixed initial point is the point on the ecliptic which is placed opposite the bright star Chaitra (Spica – a Virgins) located close to the ecliptic. This fixed point is also the vernal equinoctial point of the vernal equinox day of 285AD. Due to the precessional motion the fixed point in the sky which was opposite to the star Chaitra has shifted considerably since 285AD (23°49’ on 1st January 1997).

The Surya Siddhantic length of the sidereal year is 365.258756 days, and this is longer than the modern correct length by 3min 27s. Incidentally, the length of the year is not constant; the length mentioned above is a mean value. The actual length varies from the above sated length by as much as ±9 minutes.

4. Indian Solar Calendar

As mentioned in the previous section, a sidereal or nirayana calendar is followed under the traditional Indian system. The nirayana year comprises of twelve solar months and these are directly linked to the twelve respective **rasis** also mentioned in the previous section.

There are twelve **rasis** or zodiacs in the sky. The ecliptic lies in the middle of this zodiac belt. These twelve zodiacs divide the ecliptic into twelve equal arcs of 30° each.

In the tropical system the start of these divisions is from the vernal equinoctial point, but in the sidereal system, the start of the divisions is made from the earlier mentioned fixed point from which Mesha rasi (Aries) starts.

The length of the months are based on the time taken by the sun to traverse the respective rasis, which is the period covered from the time at which the sun enters the concerned rasi, to the time it enters the next rasi. The moment at which the sun enters a rasi is known as a **Samakranti**,

The samkranti however, may take place at any time of day or night. The day of the month of the traditional calendar known as the savanna or panchang day starts with **sunrise**. Therefore, depending on the time of the samkranti and the convention followed to determine the starting day for the month, there being four different conventions for four different regions (please refer to section "Regional Variations in the Indian Calendar"), the month may commence on the same day as the samkranti, or on the following day, or sometimes in some regions, the day after.

Due to the regional variances, sometimes the same month has different number of days in different regions. Also the same month in the same region may have different number days in different years. To elaborate, the Gregorian months have a fixed number of days for each month i.e. 30 or 31, except February, irrespective of whatever year it may be. But this is not so in the Indian calendar, which makes it unsuitable for civil use.

As mentioned earlier, the correct length of the sidereal or nirayana year is 365.256363 days. If the lengths of the months are kept fixed, the years will normally have 365 days. To keep it adjusted to its proper length of 365.256363 days, an extra day or leap year has to be added at some intervals. The correction to be made is of the left over 0.256363 day. This adds up to:

$$1/0.256363 = 3.9007 \text{ years}$$

So at an interval of every 39 years 10 days must be added. That means that there should be 10 leap years every 39 years. Since the traditional nirayana calendar does not have fixed number of days for months like the Gregorian calendar does, there is no laid down mechanical rule for determining the year which will be the leap year.

The starting day of the year and consequently its length is dependent on the actual time to transit of the sun to the 1st rasi, which is Mesha rasi, and the convention followed in determining the starting day for the months. In actual practice leap years occur at an interval of four and three years so that 10 leap years occur in a 39 year period.

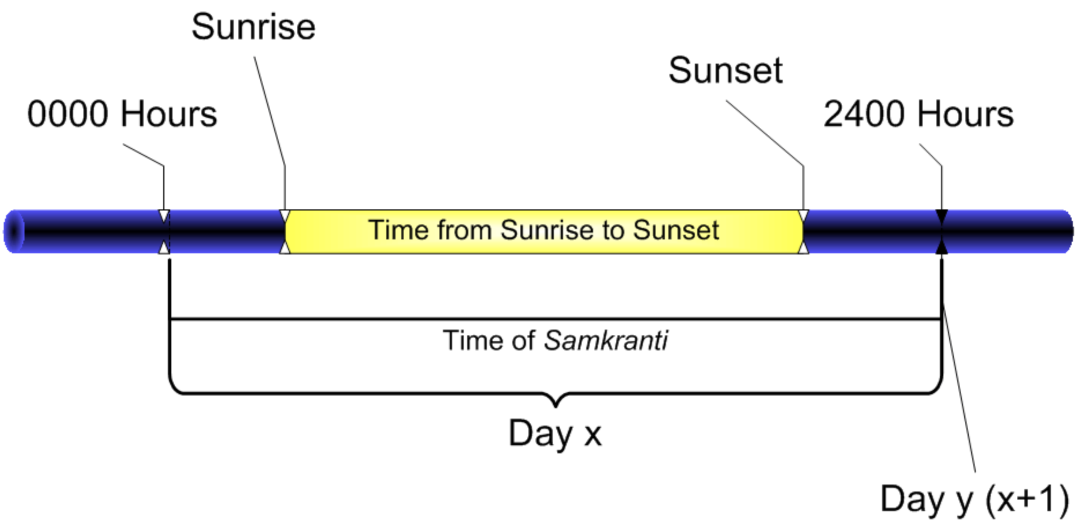
If we were to make the months of the nirayna calendar fixed we will have to adopt a mathematical way of adding leap years. This will be to have leap years every four years and an additional leap year added every 160 years. But since the lengths of the months are not fixed an astronomical method is followed.

5. Regional Variations in the Indian Solar Calendar

There are four different conventions for choosing the starting day[1] of the months followed in different regions of India.

a. **Orissa School**: The solar month begins on the same day when the sun enters the concerned rasi. This convention is followed in Orissa, Punjab and Haryana where solar calendars are used.

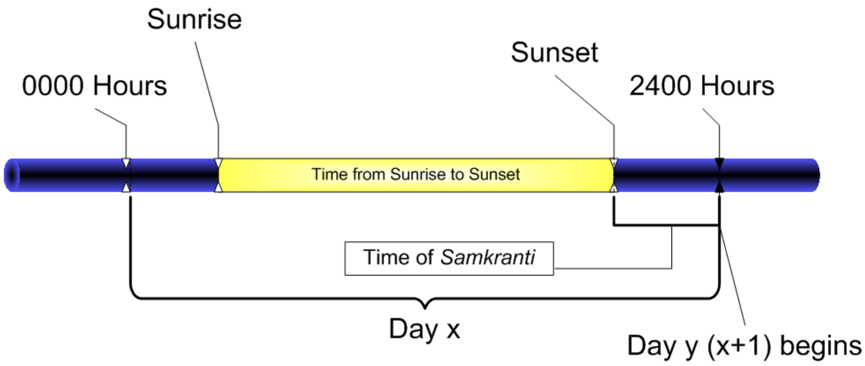
Orissa School



Month starts the same day on which the *samkranti* takes place.

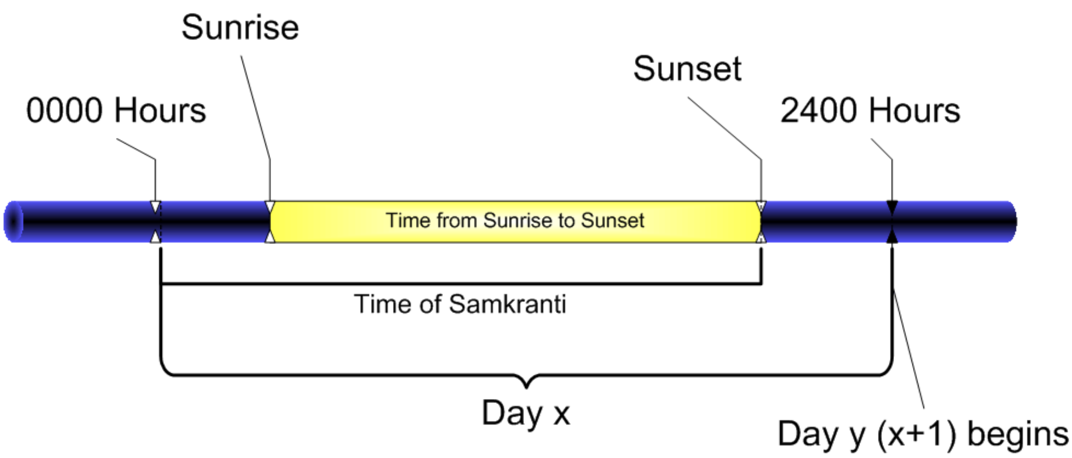
b. **Tamil School**: When the samkranti takes place before sunset, the month begins on the same day. If it takes place after sunset, the month begins on the next day. Generally followed in Tamil Nadu.

Tamil School



Case 2: When samkranti takes place after sunset, the month begins on the next day. In this case the month begins on day y.

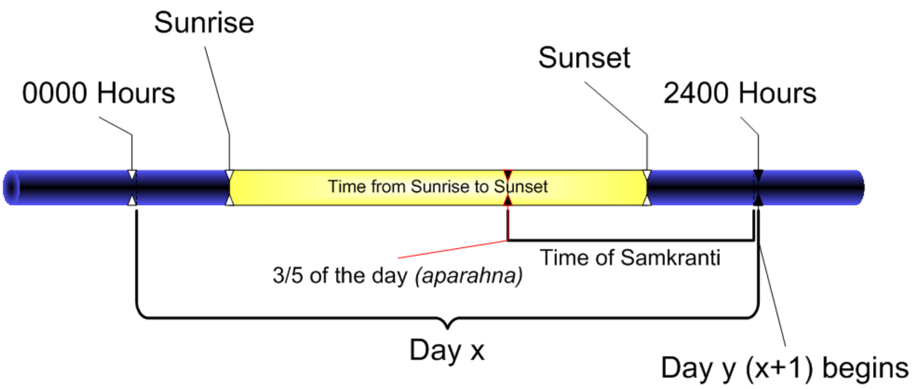
Tamil School



Case 1: When samkranti takes place before sunset, the month begins on the same day. In this case the month begins on day x

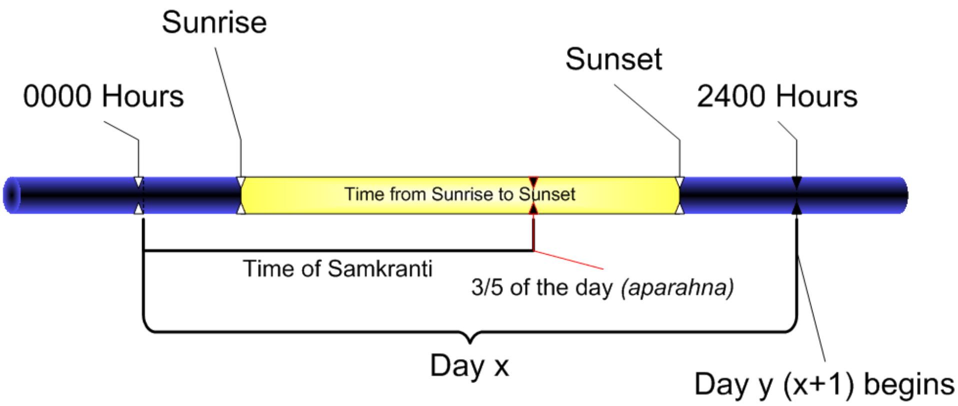
c. **Malyali School**: The month begins on the same day if the samkranti happens before aparahna, i.e., before 3/5th duration of the time from sunrise to sunset. Otherwise, it begins on the next day. Generally followed in Kerala.

Malayali School



Case 1: When samkranti takes place after 3/5 duration of the day, the month begins on the next day. In this case the month begins on day y.

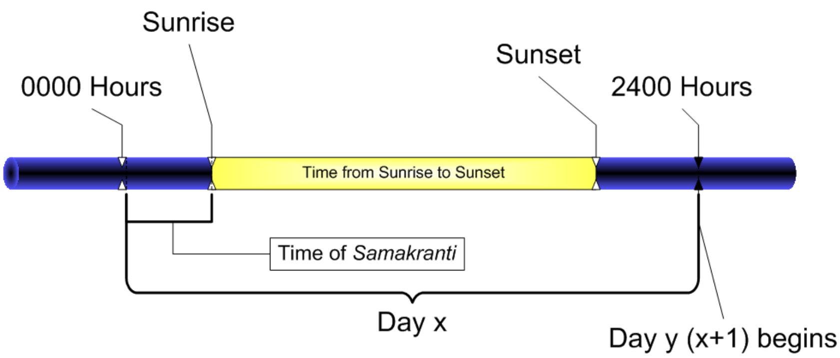
Malayali School



Case 1: When samkranti takes place before 3/5 duration of the day, the month begins on the same day. In this case the month begins on day x

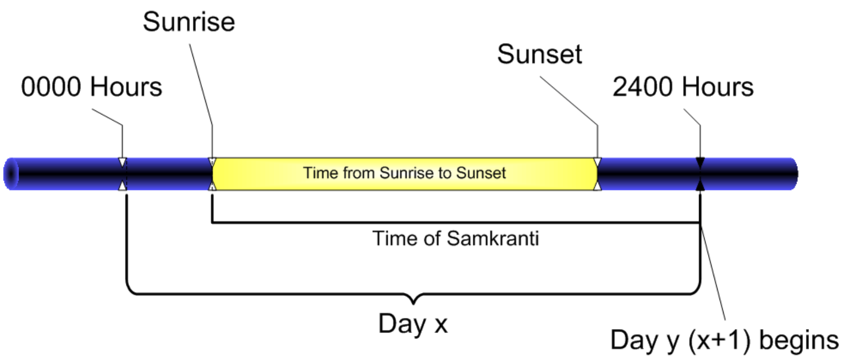
d. Bengal School: When a samkranti takes place between sunrise and the following midnight, the solar month begins on the next day, and when it begins after midnight, the month begins on the day following the next day, that is, on the third day. This is the general rule, and in some special circumstances, there are some deviations from this rule. Generally followed in Bengal, Assam and Tripura.

Bengal School



Case 2: When samkranti takes place in between midnight and sunrise, the month begins on the day after next. In this case the month begins on day z. Day z is the day after day y. Also z=x+2.

Bengal School



Case 1: When samkranti takes place in between sunrise and midnight, the month begins on the next day. In this case the month begins on day y.

The years of these calendars, except that of Kerala, starts with the sun transiting into the Mesha rasi. The transit time varies from year to year, and so does the exact length of the year calculated on this basis. Furthermore, the time of transit determines the starting days of the years of the four different schools, and these do not happen to be the same all the time.

[1]The words '**day'** refers to the panchang or savanna day, which is the period from one sunrise to the following one.

6. Luni-Solar Calendar

The basic unit of the lunar calendar is the lunar month, which is the time from one new moon to the next or from one full moon to the next. The lunar month counted from new moon to new moon is known as **amanta** and lunar calendar based on this month is called as **amanta calendar**. When the month is counted from full moon to full moon it is known as **purnimanta** and the respective calendar as **purnimanta calendar**.

As the lunar year is shorter than the solar year, and is kept adjusted to the latter by the addition of intercalary months at intervals. The starting day of the lunar year will differ from year to year and will oscillate between the days of March and April. This is because Chaitra generally covers the period from 15th March to 13th April.

6.1 Amanta Lunar Calendar

The amanta calendar is also known as **mukhyamana** (mukhya meaning primary), especially in the north, because even where purnimanta calendar is followed, the amanta calendar is used to fix the dates of festivals.

The amanta lunar calendar starts from the Chaitra. The months of the amanta lunar calendar are named after the solar months in which the new moon of the lunar month occurs.

The months are divided into two parts – **Sukla paksha** (bright half of the month), covering the time period from new moon (end of amavasya) to the next new moon (end or purnima), and **Krishna paksha** (dark half of the month), covering the period from full moon to the next new moon. The sukla paksha half is also called 'Sudi' and Krishna paksha half as 'Vadi'.

The amanta lunar year starts from the month of Chaitra from the occurrence of the solar month of the same name. The solar year, on the other hand, starts from Vaisakha when th sun enters the mesha rasi.

The amanta lunar calendar is followed in the states of the Karnataka, Andhra, Maharashtra and Gujarat. In the states where solar calendar is followed, like Assam, Bengal, Orissa, Tamil Nadu etc, the amanta calendar is used for determining the dates of various religious and socio-religious festivals and ceremonies.

In Gujarat and parts of Rajasthan however, the lunar year starts from the month of Kartika with the end of Deepvali amavasya and the start of sukla pratipada of that month. In Kutch and parts of Kathiawar, the lunar year starts from Ashadha sukla pratipada.

6.2 Tithi

Tithi is the time during which the moon gains successively 12º or its integral multiples. The tithi is the most important item in the Indian Lunar Calendar. There are 30 tithis, of which 15 are sukla paksha and 15 are krishna paksha. Tithis are serially numbered 1 to 15, and are suffixed ‘S’ – Sukla (bright half of the month) or ‘K’ – Krishna (dark half of the month).

The days of the months of the lunar calendar are numbered in accordance with the serial number of the tithi prevailing at sunrise. This means that when it is said the day is Asvina sukla dvitiya, the astronomical position is that at sunrise time. It is the second or dvitiya tithi of sukla paksha of the lunar month of Asvina (see appendix B for a listing of tithis).

As the motion of the moon is not steady, the duration of a tithi may vary from 19.98 hours to 26.78 hours. This sometimes results in a tithi period covering two successive sunrises, or falling between these, i.e. not covering any sunrise. When this happens there is a break in the counting of tithis because one tithi will be repeated and one will be omitted.

6.3 Adhika month

The mean duration of a lunar month is 29.5306 days and hence the lunar year equals 354.3672 days (29.5306*12). It is 10.89 days short of the sidereal year and 10.87 days short of the tropical year. To keep the lunar calendar adjusted to the solar calendar and to keep the lunar months linked with the solar months and the seasons, an intercalary lunar month has to be added to the lunar year at intervals. A total of seven intercalary months are added in a cycle of 19 lunar years.

((19 * 12) +7) * 29.5306 = 6939.69 days

Actual Number of days that should be in 19 sidereal years:

19 * 365.256363 = 6939.87 days

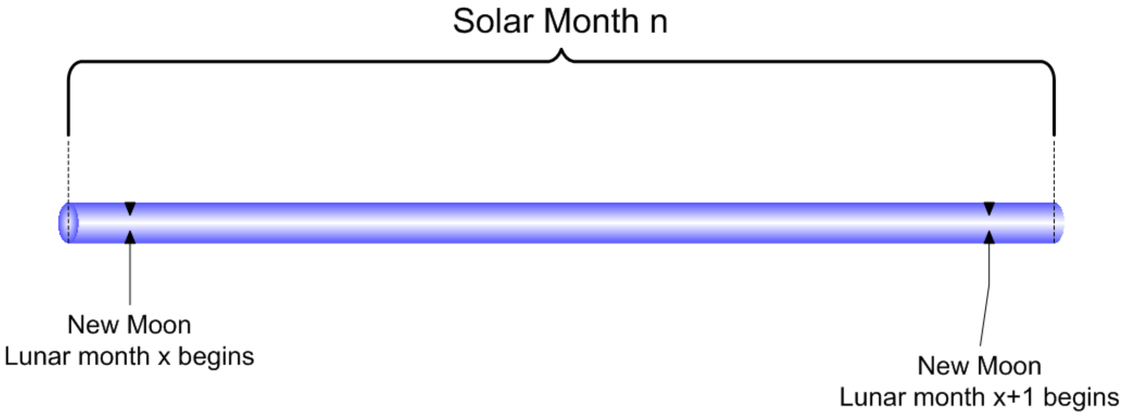
This kind of a calendar which is kept adjusted to the solar calendar is known as a luni-solar calendar.

In the Indian luni-solar calendar the intercalary months are not added in a mechanical manner. The Indian astronomers devised a method which uses the true positions of the sun and moon to add the intercalary months. When two new moons occur within one solar month then two lunar months occur with the same name based on the solar month. The first lunar month of the two is prefixed with the title '**adhika**' or '**mala**' and is considered as an intercalary month. The second one starting from the next new moon is prefixed '**suddha**' and this latter month is considered to be the true or normal month.

The mala month is omitted for fixing any religious or socio religious festivals and ceremonies, except for ceremonies of death and birth, which cannot be postponed.

Under the above system intercalary months occur at an interval of 2 years 11 months, 2 years 10 months, 2 yeas 4 months. The average time interval works out to be 2.7 years which is the theoretical average time interval for occurrence of such months.

Adhika/Mala Months

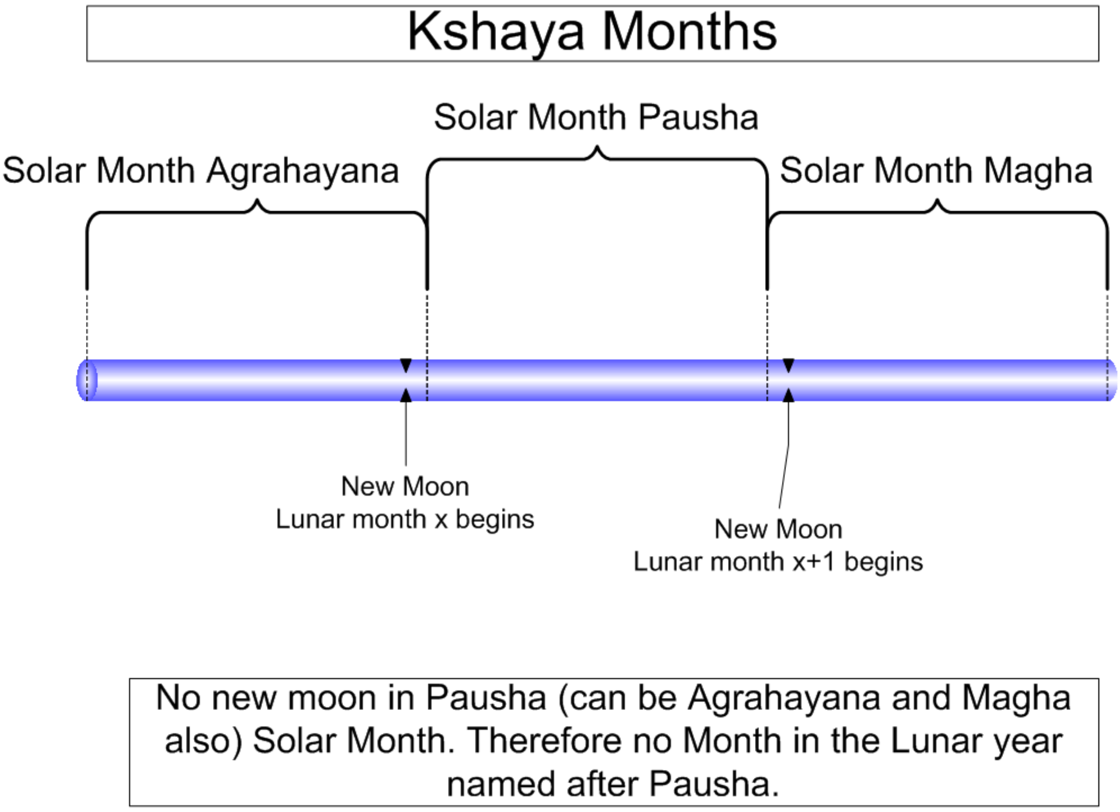


Month x will be called adhika n, and month y will be called suddha n.

6.4 Kshaya Month

It may happen that a lunar month will completely overlap any of the short three nirayana solar months of Agrahayana, Pausha and Magha. In this case, no new moon will occur in that overlapped solar month, and thus there will be no lunar month named after this solar month. There would be a missing or '**kshaya**' month in the lunar year. This might occur at intervals as close as 19, 46, 65, 76, 122 and 141 years.

When such a kshaya month occurs in a lunar year, there will always be two adhika lunar months in that period, one before and after the kshaya lunar month. One of these two adhika months is treated as an intercalary month and other one as a true month.



6.5 Purnimanta Calendar

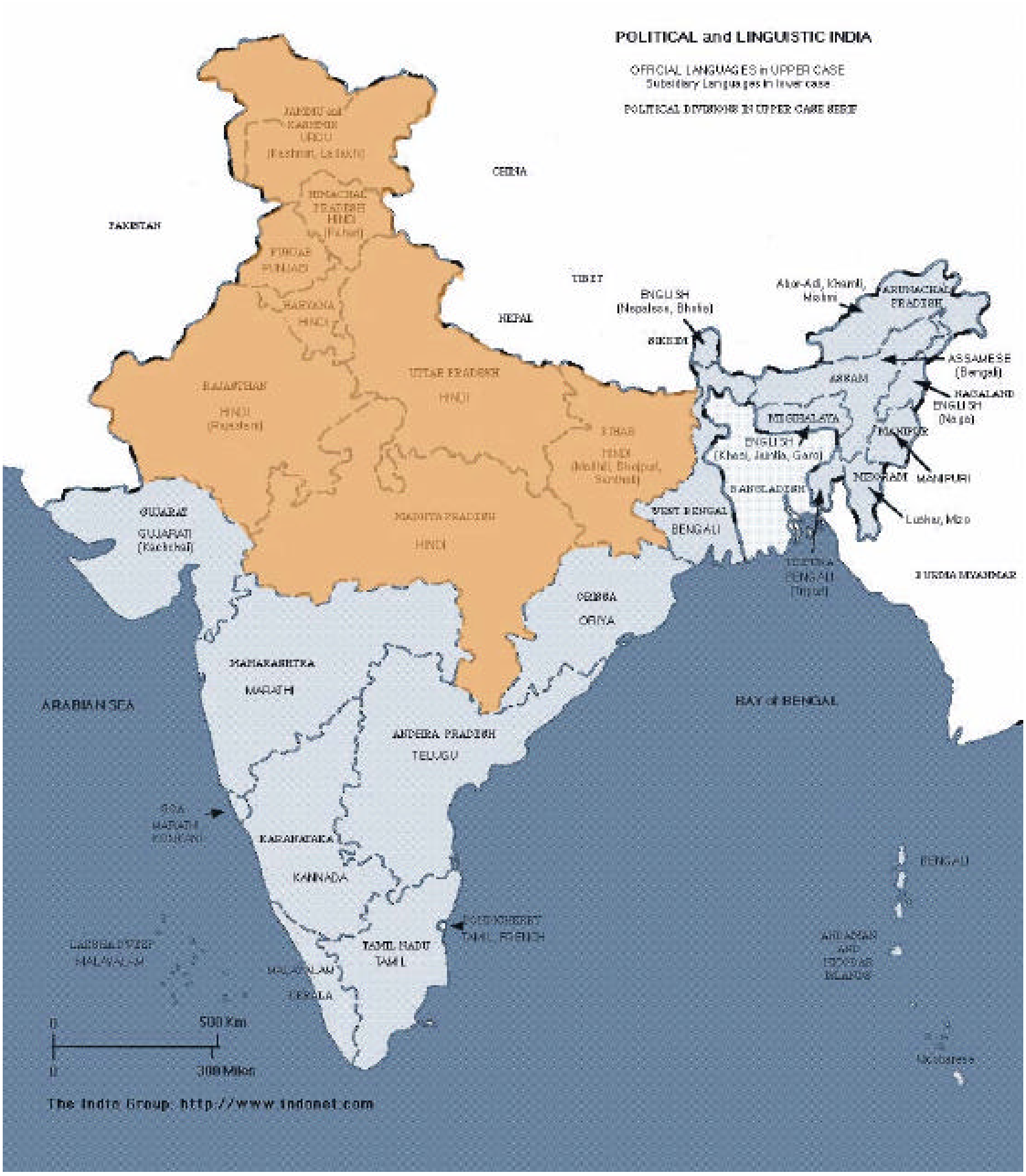
In this calendar the month covers the period from one full moon to the next. It is named after the amanta month which occurs a fortnight later. Purnimanta lunar month begins a fortnight before the initial new moon of the amanta lunar month, after which it is named; and ends in the middle of that particular amanta month.

A logical deduction would show that while an amanta month can fall completely outside the solar month it is named after, the purnimanta month would always cover at least half of the solar month in question.

Other features like pakshas are similar to those of the amanta months.

Also noteable is the fact that the first month of the year (Chaitra or Vaisakha) and the year do not start at the same time. The year starts in the middle of the lunar month chaitra, resulting in counting the krishna paksha of chaitra in the previous year. The year starts with the begining of sukla paksha of chaitra.

Regions Following Purnimanta Calendar:



7. Program Codes and Analysis

7.1 The Surya Siddhantic and Ephemeric codes

Codes written by Dershowitz and Reingold use the Surya Siddhantic methods and formulae. We have tried to apply modifications to these codes using modern, ephemeric rules. The results of our ephemeric codes and their differences with the Surya Siddhantic codes have been discussed.

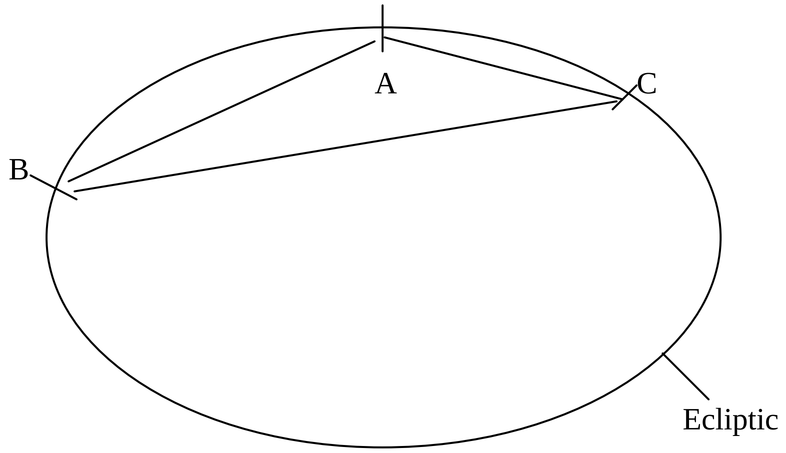
7.2 Longitudes and Hindu longitudes (Solar and Lunar)

The solar longitude measures the position of the Sun with respect to a reference point on the ecliptic.

For tropical calendars, this reference point is the March equinox point. As discussed earlier this point will recede westwards at a rate of 1.4 degrees per century due to precession of the equinoxes.

The Indian calendars are based on sidereal system. Hence, they have a different point of reference for measuring the *Hindu solar longitudes*. This point is the point on the ecliptic where the March equinox occurred on March 20, 285 A.D.

The following diagram explains the concept well:



Arc AC – Precession since Vernal Equinox 285 AD. Arc AB – Hindu solar longitude. Arc CB – Solar Longitude.

Solar Longitude for a regular day is calculated using given functions. The value of precession is calculated as follows:

1) First the number of Julian Centuries from 20March 285 A.D. to J2000 are calculated. Let this be called 'A'.

   double A = ((altFixedFromGregorian(2000,1,1) - altFixedFromGregorian(285,3,20)))/36500;

2) Then number of Julian Centuries from J2000 to the current date is calculated. Let this be called 'jc'.

   double jc = julianCenturies(F);

3) Adding the above two, and multiplying by precession constant (1.4 degrees per Century), gives us the required correction. Let this be called Pd.

   double pd = ((A+jc)*1.4);

The Ephemeric Hindu Solar Longitude is calculated using the formula:

double hinSolarLong =(solarLongitude(F) - pd);

A similar rationale extends for Ephemeric Hindu Lunar Calendars. Lunar Calendars for normal days are taken, and are then adjusted for precession to obtain the Ephemeric Hindu Lunar Calendars.

double hinLunarLong =(lunarLongitude(F) - pd);

7.3 Comparison with Surya Siddhantic Codes

Dershowitz and Reingold have used Surya Siddhantic codes for calculations of Hindu Solar and Hindu Lunar longitudes. This results in their deviation from actual Ephemeric Hindu Solar and Hindu Lunar longitudes.

Dershowitz and Reingold used overloaded method called *solarLongitude* to calculate both the normal and the Hindu Solar Longitude:

static double solarLongitude (F) is used for calculating regular Solar Longitudes. It takes in a fixed day number as an argument and returns the longitudinal measure.

static double HinduSolar.solarLongitude (F) is used for calculating Hindu Solar Longitudes. It takes in a fixed day number as an argument and returns the longitudinal measure.

Similar methods are used for calculating Hindu Lunar longitude.

Following is a summary of the observations with the two different approaches.

Gregorian Date	Solar Longitude	S.S. Hindu Solar Longitude	Ephimeric Hindu Solar Longitude	Lunar Longitude	S.S. Hindu Lunar Longitude	Ephimeric Hindu Lunar Longitude
20 March 285 A.D.	359.293	2.953	359.500	318.788	318.053	318.995
1 January 2000 A.D.	279.859	255.542	256.060	217.293	189.285	193.493

From the above we can see that, on 20 March 285 A.D., the Ephemeric Hindu Solar Longitude is 359.5, which is almost equal to 0 Degrees. (359.5 mod 360 = 0). This observation is in line with our expectation.

On the other hand, Dershowitz and Reingold's codes give us a value of 2.95 degrees, which is not acceptable.

Hence we can conclude that the Surya Siddhanta System used by Dershowitz and Reingold, is inaccurate.

7.4 JAVA Code

```
/**-----Including Libraries and specifying packages-----**/

package calendrica;
import java.io.*;
import java.lang.*;

class urop extends Gregorian
{

      public static void main(String args[]) throws IOException
    {
            BufferedReader stdin = new BufferedReader(new
InputStreamReader(System.in));

/** --------------Initializing Variables-----------**/

            int dummy1,dummy2;
            long dummy3;
            String choice ="Y";

            while (choice.equals("y")||choice.equals("Y"))
            {

/**----Getting date from user and converting to various formats----**/

                  System.out.println("Enter Current Year ");
                  String gyear = stdin.readLine();
                  dummy3 =  Integer.parseInt(gyear);

                  System.out.println("Enter Current Month ");
                  String gmonth = stdin.readLine();
                  dummy2 =  Integer.parseInt(gmonth);

                  System.out.println("Enter Current Day ");
                  String gday = stdin.readLine();
                  dummy1 =  Integer.parseInt(gday);
                  System.out.println();

                  String G = gday+" "+gmonth+" "+gyear;

                  double J=
Math.round(jdFromFixed(altFixedFromGregorian(dummy3,dummy2,dummy1)));

                  long F = altFixedFromGregorian(dummy3,dummy2,dummy1);

                  System.out.println("Gregorian Date: "+G+" Fixed Date:
                  "+F+" Julain Date: "+J);


/** ------------calculation of A, Pd, jc and longitudes-------------**/

                  double A = ((altFixedFromGregorian(2000,1,1) -
                  altFixedFromGregorian(285,3,20)))/36500;
                  double jc = julianCenturies(F);
```

```
                  double pd = ((A+jc)*1.4);
                  double hinSolarLong =(solarLongitude(F) - pd);
                  double hinLunarLong =(lunarLongitude(F) - pd);

/** -------------------output to user --------------------**/

                  System.out.println();
                  System.out.println();
                  System.out.println("Solar
Longitude"+"\t"+"\t"+"Ephermesist Hindu Solar
Longitude"+"\t"+"\t"+"Surya Siddhantic Hindu Solar Longitude");


System.out.println(solarLongitude(F)+"\t"+"\t"+hinSolarLong+"\t"+"\t"+"
\t"+"\t"+HinduSolar.solarLongitude(F));
                  System.out.println();
                  System.out.println("Lunar
Longitude"+"\t"+"\t"+"Ephermesist Hindu Lunar
Longitude"+"\t"+"\t"+"Surya Siddhantic Hindu Lunar Longitude");

      System.out.println(lunarLongitude(F)+"\t"+"\t"+hinLunarLong+"\t"+
"\t"+"\t"+"\t"+HinduLunar.lunarLongitude(F));
                  System.out.println();
                  System.out.print("Any More dates? (Y/N) ");
                  choice = stdin.readLine();
            }
}}
```

Appendix A

A listing of the Indian rasis with the corresponding English name is provided below.

1.	Mesha	Aries
2.	Vrisha	Taurus
3.	Mithuna	Gemini
4.	Karkata	Cancer
5.	Simha	Leo
6.	Kanya	Virgo
7.	Tula	Libra
8.	Vrischika	Scorpio
9.	Dhanus	Sagittarius
10.	Makara	Capricorn
11.	Kumbha	Aquarius
12.	Mina	Pisces

A listing of the rasis and respective months they are linked with.

1.	Mesha	Vaisakha
2.	Vrisha	Jyaistha
3.	Mithuna	Ashadha
4.	Karkata	Sravana
5.	Simha	Bhadra
6.	Kanya	Asvina
7.	Tula	Kartika
8.	Vrischika	Argahayana
9.	Dhanus	Pausha
10.	Makara	Magha
11.	Kumbha	Phalguna
12.	Mina	Chaitra

Appendix B

A listing of the tithis in a lunar month.

S	K	1.	Pratripada	S	K	8.	Ashtami
S	K	2.	Dvitiya	S	K	9.	Navami
S	K	3.	Tritiya	S	K	10.	Dasami
S	K	4.	Chaturthi	S	K	11.	Ekadasi
S	K	5.	Panchami	S	K	12.	Dadasi
S	K	6.	Sashthi	S	K	13.	Trayodasi
S	K	7.	Saptami	S	K	14.	Chaturdasi
				S	K	15.	Purnima
				S	K	30.	Amavasya

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