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UNIFORM ALL INDIA NIRAYAṆA SOLAR CALENDAR

A number of endeavours have been made in the past covering a period of nearly 50 years to achieve the national objective to have a uniform all-India calendar for the country not only for the much required uniformity but also to help to bring about regional integration and national unity. Several committees/ seminar were set up by different Govt. bodies for the purpose. These are as follows, placed in chronological order:

a) Calendar Reform Committee constituted by CSIR in November, 1952, under the chairmanship of Professor M N Saha which submitted its report in September, 1954.

b) Review Committee on Indian Calendar and Positional Astronomy constituted by DST in February, 1986 under the chairmanship of Professor S P Pandya which submitted its report in March, 1988.

c) All-India seminar or *pañcāṅg* makers, *pañcāṅg* pandits, and calendric astronomers held under the aegis of Ministry of Human Resources Development for three days in April, 1994, and whose resolutions were circulated in July, 1994.

d) 'Peer Review Committee' on Indian Calendar and Positional Astronomy constituted in November, 1998, under the chairmanship of Dr. R R Kelkar which submitted its report in May, 2002.

The latest, the Peer Review Committee recommended introduction of a uniform all-India *nirayaṇa* solar calendar the dates of which will be shown in *Rāstrīya pañcāṅgs* along with the dates of the existing calendars. The intention was that this calendar which had been framed scientifically and on traditional *nirayaṇa* principles should be adopted by all *pañcāṅg* makers of all regions to have a uniform Indian calendar in the country in place of a divergent regional calendars. Recommendations made by the Peer Review Committee was accepted by the Government in October, 2002.

Background History and Eventual Recommendations

This note describes the history of formation of all committees and of a seminar and the ultimate acceptance of a uniform all-India solar calendar by the Govt. It also indicates the relationship of month-days of this calendar with those of the Gregorian calendar.

1. The great drawback in our traditional calendric system has been the absence of a scientific and uniform calendar which can be conveniently used for all purposes, and is shown in all *pañcāṅgs* which may be said to be custodian in the keeping of our traditional calendars. Such an all-purpose calendar has to be a solar one by which future and past dates can be easily determined. Unfortunately in our traditional solar calendar the starting day of the month is not fixed, and its length may vary from year to year, and so it is not suitable for general calendric purposes. This is because the starting day of the month is determined on the time of ingress of the sun to the concerned linked *rāśi* and thus the length is determined on the time taken by the sun from its ingress to the concerned *rāśi* to the time of ingress to the next *rāśi*. However, the ingress of the sun from one *rāśi* to the next, known as '*saṃkrānti*', may take place at any time of the day or night, but the day of the month of the traditional calendar starts from sunrise which varies from place to place. Unfortunately again there is no uniform rule or convention in fixing the starting day of the month on the time of ingress of the sun to a *rāśi*.

2. There happens to be four different schools following four different methods to determine the starting day of the month. This has been resulting in the month-beginning days of solar months of different regions of the country often differing by 1 to 2 days, and also integral number of days of different solar months may vary from year to year because of this procedure. Obviously this method of calendar keeping is very unsatisfactory, and not suitable for adoption for an all purpose standard civil calendar because one can not fix a date for a future event and also can not state a date for past event even if gap of time period is known unless almanacs have been consulted.

3. This lacuna in not having a proper Indian calendar was being felt by many, and after independence the Government in Council of Scientific and Industrial Research (CSIR) appointed a Committee, named as 'Calendar Reform Committee' in November, 1952, under the chairmanship of Professor M N Saha

and with Shri N C Lahiri as its Secretary and five other members "to submit proposals for an accurate and uniform calendar for the whole of India". Incidentally though the terms of reference of the committee directly affected all the *pañcāṅg* makers, there was no member of this profession in this committee to express their view point.

4. The Committee submitted its report in September 1954, and recommended a fundamental change in calendar keeping by discarding the traditional sidereal or *nirayaṇa* system which has been in use for more than 1500 years or so, and by adopting in its place the *sāyaṇa* or tropical system. It recommended that the year would be a tropical one and its first month will be Caitra, and it would start from the day following vernal equinox day, that is from the day corresponding to 22 March, and that the leap year for this calendar was to be reckoned in the same year in which leap year occurs for the Gregorian calendar. The months of this calendar were, however, named as Caitra, Vaisakha, etc. to Phālguna like those of the traditional *nirayaṇa* calendar though the new calendar was different from it. The months of this calendar had fixed number of days as follows: Caitra – 30 days, next five months Vaiśā kha to Bhā dra – 31 days, and the remaining six months Āśvina to Phālguna – 30 days. In leap years Caitra will have 31 days. It may be remarked that by adopting the same name for the months for this new calendar as that of the traditional calendar, and further time period of the same named months of the two calendars overlapping each other, has created a lot of confusion between the dates of these calendars, and has increased the existing muddle of Indian calendric system.

5. For luni-solar calendar which is used for fixing days of religious festivals, ceremonies, rites, etc. Saha Committee also recommended adoption of the same *sāyana* system by pegging the lunar months with the same named solar months of a *sāyana* solar calendar. This solar calendar, however, for this purpose was recommended to start 23°15′ ahead of the vernal equinox in order to keep a link with the months of the prevailing nirayaṇa lunisolar calendar at the start. As per this proposal Vaiśā kha, Jyaiṣṭha, Aṣaḍa etc. of this *sāyana* solar now calendar will commence when *sāyaṇa* longitude of the sun will be respectively 23°15′, 53°15′, 83°15′ etc. This meant having two solar calendars, which was somewhat abnormal.

6. Government accepted the new *sāyana* solar calendar as recommended by Saha Committee for use as a uniform calendar in place of divergent regional calendars, and introduced it w.e.f. 22 March 1957, as a 'national calendar', and the dates of this calendar are being shown as those of a primary calendar along with the dates of Gregorian and Islamic calendars in *Rāṣṭrīya Pañcāṅgs* which started being published in different regional languages by the Nautical Almanac Unit which was established in December 1955, and was recoganised as Positional Astronomy Centre on 1 December 1979.

Govt. however, did not accept the proposed the *sāyana* luni-solar calendar, and decided to continue with the traditional *nirayaṇa* luni-solar calendar for fixing the days of religious festivals, ceremonies, etc. as had been the practice in the past. Saha Committee's apparent intention of recommending *sāyana* system of calendar keeping primarily was that our festivals should continue to be performed in the present seasons and not deviate from these, and to achieve this they proposed adoption of a non-traditional sayana lunisolar calendar. As mentioned, Government after full consideration rejected adoption of this new calendar for good reasons. Introducing only then the *sāyana* solar calendar served no useful purpose as *sāyana* or tropical Gregorian calendar was already in use, and adding one more calendar increased the existing confusion in calendar keeping, and more so as the name of the months of this new calendar were kept the same as that of the traditional calendar.

7. The newly introduced *sāyana* solar calendar expectedly did not find acceptance in any manner with *pañcāṅg* makers of the country, and only a few *pañcāṅg* makers showed it as an additional calendar increasing the existing confusion of Indian calendar. In early 1986, the writer of this article, Cmde. S. K. Chatterjee, approached the Government in the Department of Science & Technology pointing out that though Saha Committee's tropical solar calendar had been introduced more than 28 years back, it had not succeeded in any manner in its objective to be used as an all-India calendar replacing the divergent regional calendars which was the aim in introducing the new calendar. *Pañcāṅg* makers, who are for all purposes keepers of our traditional calendar, have not accepted at all the divergent *sāyana* Saha Committee's calendar, and it is being only shown in *Rāṣṭrīya Pañcāṅgs*. The matter requires an urgent review. Department of Science & Technology was approached because Positional Astronomy Centre

was placed under India Meteorological Department which again functioned under Department of Science & Technology. DST after considering the problem constituted a 'Review Committee on Indian Calendar and Positional Astronomy' in February, 1986, with Professor S P Pandya, Director, Physical Research Laboratory Ahmedabad as its Chairman, and Commodore S K Chatterjee (Retd.) as its Convener, and with seven other members. Unlike the previous committee, it included a prominent *pañcāṅg* maker who was Pandit Dhundiraj Sastri Date, editor of well known *Dāte pañcāṅg*. The terms of reference given to the committee so far Indian Calendar was concerned was as follows: "To review the present status of Saha Committee's solar calendar, its acceptance by *pañcāṅg* makers and others substituting other regional calendars in use, and to recommend necessary modifications to attain the objectives of a national calendar".

8. In view of the above terms of reference, a seminar of *pañcāṅg* makers and *pañcāṅg* pandits of different regions was held at Bombay in January, 1987, under arrangements made by the Review Committee which was attended by the Chairman, Convener, Pandit Date, and a number of other members. Dr. B. V. Raman, a prominent astrologer and calendric astronomer attended the seminar as a special invitee. It was agreed by all those present that there was an urgent need to have a uniform and standard all-India calendar to be used by all *pañcāṅg* makers and others, and such a calendar for general acceptance and use has to be framed on *nirayaṇa* basis. This calendar to become a uniform and an all purpose one, will necessarily have to have fixed number of days for the months. The year should start, as it is now the general practice, with the sun entering *Meṣa rāśi*, which will be taken as 14 April of Gregorian calendar. The five summer months Vaisākha to Bhādra will have 31 days, and the remaining seven months Āśvina to Caitra will have 30 days. This calendar necessarily will have leap years at laid down intervals when Caitra will have 31 days. The era for this all-India calendar will be Kali era whose epoch is midnight 17/18 February 3102 BC. In this calendar there will be normal leap years at cyclic intervals of 4 years, which will be Kali era divisible by four. There will also be additional leap years at the required cyclic intervals as the year length of *nirayaṇa* or sidereal year is 365.25636 days, and the length 0.00636 day will require to be adjusted after 0.25 day has been catered by normal leap years at 4-year cyclic intervals.

9. The Review Committee, however, on considering the above proposal of a standard *nirayaṇa* calendar made by *pañcāṅg* pandits at the seminar, recommended that Saha Committee's *sāyana* calendar introduced by the Govt. as a national calendar in March, 1957, be given a further trial for five more years with the Government taking measures to make it popular, and after this period the status of Saha Committee's calendar should be reviewed by another experts' committee, and appropriate measures then taken. Pandit Date and Commodore Chatterjee dissented to this resolution stating that it was not keeping with the opinion obtained at the seminar of pandits held in the context of the terms of reference given to the committee. Their notes of dissent were later put in writing in the report. The report of the Review Committee was submitted to the Department of Science & Technology in March, 1988.

10. The stalemate in having a uniform all-India calendar to be adopted by all *pañcāṅg* makers for general use continued as before, as Saha Committee's national calendar did not become any more popular in subsequent years. The national necessity to have a uniform calendar for our country continued to agitate the minds of progressive people. In an endeavour to resolve this problem, the writer, Cmde. S K Chatterjee, discussed the matter with Dr Mandan Mishra, the then Vice-Chancellor of Lal Bhahadur Shastri Rashtriya Sanskrit Vidyapeeth, New Delhi, which has a renowned Jyotish Department and publishes annually a *pañcāṅg*, and as a result, Vidyapeeth took up this question with the Ministry of Human Resources Development who appreciated the importance of this problem which has an important social and cultural bearing, and expressed their willingness to tackle it. L. B. S. Rashtriya Sanskrit Vidyapeeth in association with Maharashi Sandipani Rashtriya Vedavidya Pratisthanam at Ujjain, arranged an elaborate all-India conference of *pañcāṅg* makers, *pañcāṅg* pandits, calendric astronomers from all regions of the country comprising as many as 45 persons, and deliberated in detail over various problems on calendar, *pañcāṅg* making and related matters over three days from 25 to 27 April, 1994, at New Delhi with Dr. B V. Raman as Chairman, and Dr Mandan Mishra, Vice Chancellor of L. B. S. Sanskrit Vidyapeeth and Cmde S K Chatterjee as Vice-Chairmen. Professor Sukdev Chaturvedi, Head of Jyotiṣa Dept. of the Vidyapeeth acted as the co-ordinator of the conference, and was assisted in the task by Cmde. S. K. Chatterjee. The conference in their discussion on calendar reiterated the opinion expressed earlier at Bombay seminar held in January, 1987, that it was very

necessary for general convenience as well as for national integration and unity of the country to have a uniform all-India calendar which should be shown in *pañcā ṅgs* of all regions, and used as a standard calendar. The pattern of this calendar proposed after deliberation at this conference turned out to be the same as that recommended at Bombay Conference, as elaborated at para 8 above. It was however suggested that the additional leap year may be made to occur at the cyclic intervals of 160-years.

11. It was clarified during deliberation that the present proposal in the months having fixed number of days for all-India standard calendar will not interfere with the present procedure of fixing the time for religious festivals and ceremonies which are dependent on lunar months, and this will remain undisturbed. These months will continue to be linked as at present with solar months, calculated on the basis of exact time of ingress and exact time of exit of the sun to and from the concerned *rā śis*.

12. It was also resolved that all *pañcāṅg*s will continue to be framed on *nirayaṇa* principles of calendar keeping, and for this purpose the fixed initial point will be the point in the ecliptic which was the vernal equinoctial point of vernal equinox day of 285 AD. This point was then almost opposite the star 'Citrā (α Virginis), that is, the star Citrāwas almost 180° from this initial point.

13. It was brought out at the conference that unlike all other professional bodies, *pañcāṅg* makers of the country have no association of their own where as a compact professional body all problems regarding *pañcāṅg* making including calendrical matters, publications, distribution, sales, points regarding standardization, improvements, and all other concerned matters can be discussed and some unified action taken. As *pañcāṅg* is used in almost every household, its impact on social life is immense, and Government's help may be sought to establish and maintain such an Association. The conference resolved that an Association of *pañcāṅg* makers, *pañcāṅg* pandits and Calendric astronomers should be formed with head quarters at New Delhi, and later branch offices may be opened at capital cities of different states.

14. In spite of all these efforts, no effective progress was made in the introduction and use of a uniform Indian calendar which had the general approval of *pañcāṅg* makers in different seminars as mentioned earlier. It seemed that as

the Government had earlier introduced Saha Committee's solar calendar as 'national calendar' to become the uniform Indian calendar, replacing different regional calendars, Govt's acceptance in the use of a *nirayaṇa* solar calendar as an all-India calendar for this purpose would be very helpful in resolving this long outstanding issue. Further Review Committee on Indian Calendar & Positional Astronomy set up previously by the Govt. which submitted its report in March, 1988 stated, as mentioned earlier, that the popularity of Saha Committee's national calendar shall be reviewed after its continued use for a further use for a further period of five years by another experts' committee, and appropriate measures then should be taken. In view of the above position, the writer Cmde S K Chatterjee again approached the government by pointing out the fact that the matter of having one uniform Indian calendar for all regions has remained unresolved, and the so called national calendar has not become any more popular though ten years have elapsed since submission of their report by the Review Committee in March, 1988, and submitted that steps be taken to finally resolve this long outstanding national issue which had remained unresolved for the last 45 years. Dept. of Science and Technology in consultation with the Min. of Home Affairs considered this matter over again, and to resolve this outstanding problem constituted a committee named as "Peer Review Committee on Indian Calendar and Positional Astronomy" in November, 1998, with Dr R R Kelkar, Director General of Meteorology as its Chairman, Director of Positional Astronomy Centre as Convener, and six other members which included the writer, representative of Ministry of Home Affairs, Head of Jyotish Dept. Benaras Hindu University, Professor of Astronomy of Osmania University, a representative of Science and Technology, and Dr. B V Raman. Unfortunately Dr B V Raman expired before holding of the first meeting of the committee. The terms of reference of the Peer Review Committee so far calendar was concerned was as follows: "To review the present state of use of the national calendar and suggest necessary changes acceptable to *pañcāṅg* makers and others".

15. The Peer Review Committee sent a detailed questionnaire to a large number of *pañcāṅg* makers and *pañcāṅg* pandits all over the country enquiring about their adoption of Saha Committees' national calendar as an all India calendar in place of divergent regional calendars, and if they have not done so,

their view in accepting a *nirayaṇa* calendar with fixed number of days for the months for this purpose. It also enquired about their acceptability in the use of Kali era for this calendar. The Committee also appointed a sub-committee to study the above proposal, and make their recommendations. The Peer Review Committee had three sittings, and after studying and deliberating on the views expressed by *pañcāṅg* makers in their replies to the questionnaire sent to them, and on the recommendations made by the sub-committee set up for the purpose, the committee made the following recommendations so far the calendar was concerned.

16. Considering the fact that the present national calendar which is a *sāyana* (tropical) calendar, was devised to conform to seasons, and also that it is not advisable to change the national calendar for reasons of continuity, the Committee recommended that the existing national calendar may be continued. However, considering the fact that the introduced national calendar is not used for traditional purposes which follow *nirayaṇa* (sidereal) calendric system and that there are divergent practices within the traditional system, and considering willingness expressed by a large number of *pañcāṅg* makers to adopt a uniform system if it was available, the committee felt that it would be very desirable to have an all-India *nirayaṇa* calendar, for the purpose of unification of traditional calendric practices in the country. It, therefore, recommended that the Positional Astronomy Centre should compile a separate all-India *nirayaṇa* calendar the dates of which will be shown in *Rāṣṭrīya Pañcāṅg* in addition to the present practice of showing the dates of national calendar, Gregorian calendar, and Islamic calendar. The Era for this calendar would be Kali era whose epoch is midnight 17/18 February – 3101 AD Julian Calendar. The year shall start with the month of Vaiśākha when the sun enters *nirayaṇa Meṣa rāśi*, which will be taken as 14 April of Gregorian calendar, and shall have a length of 365.25636 days. The detailed structure of the aforesaid all-India *nirayaṇa* solar calendar as recommended by the committee is shown in the Appendix-A. The Committee submitted its report to Dept. of Science & Technology in May, 2002.

17. Department of Science & Technology in the Ministry of Science & Technology after fully considering the report accepted in October, 2002, the aforesaid recommendations made by Peer Review Committee on the introduction an all-India *nirayaṇa* calendar. Necessary action has been taken by

Positional Astronomy Centre to incorporate this calendar in the issues of *Rāṣṭrīya Pañcāṅg*. The acceptance of the recommendations by the Govt. was a matter of great satisfaction because it was a happy culmination of many years of incessant effort made through a number of discussions, meetings, seminars, and committees for the framing and use of a uniform all-India *nirayaṇa* solar calendar.

18. However, it is more important and very necessary that *Pañcāṅg* makers of all regions start now showing the dates of this calendar in their *Pañcāṅgs* to achieve the long cherished objective of having a uniform Indian Calendar framed on our trandtional system which, apart from providing advantage in daily working, will greatly help to achieve the much desired uniformity in our traditional calendars which in turn will bring about national integration and unity of different regions. *Pañcāṅg* makers, therefore, should take urgent action to adopt in their *Pañcāṅgs* this uniform *nirayaṇa* Indian Calendar. If this is not done, success achieved in getting the Government to accept a uniform Indian *nirayaṇa* calendar and to have it introduced in *Rāṣṭrīya Pañcāṅgs* after a persistent effort made in last many years will get lost, and the much sought national aim will remain unachieved. If this happens it will be detrimental in the maintenance of the Indian traditional system of calendar.

19. It may be stressed that to achieve the above objective, and to make all round progress in *pañcāṅg* making and related matters, and also to preserve our traditional system and culture, it is very necessary to establish as early as possible an active and progressive an all-India Association of *pañcāṅg* makers, *pañcāṅg* pandits and calendric astronomers like other associations of learned professions. Govt.'s assistance may be sought as may be required for this important association which will have a bearing on the social and cultural aspects of society. This association should not only look after the interest of *pañcāṅg* makers but also maintain and progress our traditional system, modifying it as may be needed to keep in step with modern advancement so that our cultural heritage and identity is preserved and not lost.

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Appendix – A

Structure of all-India Nirayaṇ a Solar Calendar

1. The length of *nirayaṇa* year shall be taken as 365.256363 days.

2. The length of normal year will be 365 days.

3. The calendar day will start from midnight IST.

4. The era for this calendar will be Kali Era whose epoch is mid-night (IST) 17/18 Feb., -- 3101 AD or 3102 BC Julian Calendar.

5. The year shall start with the month of Vaiśākha when the sun enters *nirayaṇa Meṣa rāśi*, which will be 14th April of the Gregorian Calendar.

6. The 1st point of *Meṣa rāśi,* which is the initial point of *nirayaṇa* zodiac, is the point in the ecliptic which coincides with the vernal equinoctial point of vernal equinox day of 285 AD. [This point is that which was then almost opposite the star Citrā (α Virginis)].

7. Twelve months of the year will have names as Vaiśākha, Jyaiṣṭha, Āṣāḍa etc. ending with Caitra.

8. The first five months will have 31 days, and the remaining seven months will have 30 days each.

9. To adjust the uncounted length of 0.256363 day over the length of 365 days of normal years, there will be a leap year at every fourth year, when the length of the year will be 366 days.

10. The Kali era year which is divisible by four will be deemed as a leap year when the month of Phālguṇa will have 31 days.

11. To adjust the remaining uncounted length 0.006363 day of the *nirayaṇa* year, there will be additional leap years at cyclic intervals fixed between 160 and 150 years.

Note:

1. The start of the all-India *nirayaṇa* solar calendar may be taken to be the moment at which 5101 Kali starts, and as such normal leap years will be taken to occur in Kali era years of 5104, 5108 etc. which are divisible by 4, vide item 10 of Appendix – A.

2. An appropriate year-interval for occurrence of additional leap years, mentioned at item 11 of the Appendix, has been worked out, and the proposal now is to have the 1st additional leap year at 78th year counted from the starting year of the calendar which will be assumed as 5101 Kali, and all subsequent ones at cyclic intervals of 156 years from the first one. This means that additional leap years will occur at the years counted from the starting year of the calendar which are multiple of 78 by odd numbers. Thus, these years will be $1 \times 78 = 78^{th}$ year, that is at 5178 Kali year, $3 \times 78 = 234^{th}$ year, that is at 5334 Kali year, $5 \times 78 = 390^{th}$ year, that is at 5490 Kali year, and so on. The alternative method to determine these years will be to multiply 80 with odd numbers and deduct from this product the quantity obtained by multiplying 2 with the same odd numbers. For example, the years where additional leap years will occur will be : $(1 \times 80) - (1 \times 2) = 78^{th}$ year, $(3 \times 80) - (3 \times 2) = 234^{th}$ year, $(5 \times 80) - (5 \times 2) = 390^{th}$ year and so on as above.

3. The reason for making this proposal is as follows. At the end of 156 years, length of the year requiring adjustment by additional leap year will be $156 \times 0.00636 = 0.992$ day = almost 1 day. But at the 156th year, and at its integral multiple years, a normal leap year will also occur, and hence if an additional leap year is also made to occur in the same year, the length of that year will then become 367 days, an addition of 2 days over normal length of 365 days, which is not desirable. Further the accumulated error between 78th and 156th year in each cycle will be appreciable. To avoid these drawbacks it has been proposed to have the 1st additional leap year at 78th year, and all subsequent ones at cyclic intervals of 156 years from the first one. This will prevent in having two leap years in the same year, and also keep the accumulated error low between two successive leap years. This process has been elucidated in Annexure-II.

4. The reason for choosing Phālguṇa to have an extra day when leap years occur, in the all-India *nirayaṇa* solar calendar is that this month corresponds to

February of the Gregorian calendar which has an extra leap day in leap years. Thus 29th February will fall in the middle of Phālguṇa, and so this procedure will be helpful to maintain in the best possible way a link between the dates of the two calendars for all twelve months of the year as shown at Annexure-1.

5. Kali era year is to be counted on the basis of true motion of the Sun as it is done for Śaka solar years.

Annexure-1

Chart showing the relationship between the dates of all-India nirayana solar calender and those of the Gregorian calendar –marked in the bracket below

1 Vaiśākha –31days (14 April to 14 May)

1	2	3	4	5	6	7	8	9	10	11
(14 Apr.)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
12	13	14	15	16	17	18	19	20	21	22
(25)	(26)	(27)	(28)	(29)	(30)	(1 May)	(2)	(3)	(4)	(5)
23	24	25	26	27	28	29	30	31		
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)		

2. Jyaiṣṭha - 31 days (15 May to 14 June)

1	2	3	4	5	6	7	8	9	10	11
(15 May)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
12	13	14	15	16	17	18	19	20	21	22
(26)	(27)	(28)	(29)	(30)	(31)	(1 Jun)	(2)	(3)	(4)	(5)
23	24	25	26	27	28	29	30	31		
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)		

3. Āṣāḍa - 31 days (15 June to 15 July)

1	2	3	4	5	6	7	8	9	10	11
(15 Jun)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
12	13	14	15	16	17	18	19	20	21	22
(26)	(27)	(28)	(29)	(30)	(1 Jul)	(2)	(3)	(4)	(5)	(6)
23	24	25	26	27	28	29	30	31		
(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)		

4. Śrāvaṇa - 31 days (16 July to 15 August)

1	2	3	4	5	6	7	8	9	10	11
(16 Jul)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)
12	13	14	15	16	17	18	19	20	21	22
(27)	(27)	(29)	(30)	(31)	(1 Aug)	(2)	(3)	(4)	(5)	(6)
23	24	25	26	27	28	29	30	31		
(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)		

5. Bhādra - 31 days (16 August to 15 September)

1	2	3	4	5	6	7	8	9	10	11
(16 Aug)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)
12	13	14	15	16	17	18	19	20	21	22
(27)	(28)	(29)	(30)	(31)	(1 Sept)	(2)	(3)	(4)	(5)	(6)
23	24	25	26	27	28	29	30	31		
(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)		

6. Āśvina - 30 days (16 September to 15 October)

1	2	3	4	5	6	7	8	9	10	11
(16 Sept)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)
12	13	14	15	16	17	18	19	20	21	22
(27)	(28)	(29)	(30)	(1 Oct)	(2)	(3)	(4)	(5)	(6)	(7)
23	24	25	26	27	28	29	30			
(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)			

7. Kārttika - 30 days (16 October to 14 November)

1	2	3	4	5	6	7	8	9	10	11
(16 Oct.)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)
12	13	14	15	16	17	18	19	20	21	22
(27)	(28)	(29)	(30)	(31)	(1 Nov)	(2)	(3)	(4)	(5)	(6)
23	24	25	26	27	28	29	30			
(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)			

8. Agrahāyaṇa or Mārgaśīṣa - 30 days (15 November to 14 December)

1	2	3	4	5	6	7	8	9	10	11
(15 Nov)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
12	13	14	15	16	17	18	19	20	21	22
(26)	(27)	(28)	(29)	(30)	(1 Dec)	(2)	(3)	(4)	(5)	(6)
23	24	25	26	27	28	29	30			
(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)			

9. Pauṣa -30 days (15 December to 13 January)

1	2	3	4	5	6	7	8	9	10	11
(15 Dec)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
12	13	14	15	16	17	18	19	20	21	22
(26)	(27)	(28)	(29)	(30)	(31)	(1 Jan)	(2)	(3)	(4)	(5)
23	24	25	26	27	28	29	30			
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)			

10. Māgha - 30 days (14 January to 12 February)

1	2	3	4	5	6	7	8	9	10	11
(14 Jan)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
12	13	14	15	16	17	18	19	20	21	22
(25)	(26)	(27)	(28)	(29)	(30)	(31)	(1Feb)	(2)	(3)	(4)
23	24	25	26	27	28	29	30			
(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)			

11. Phālguna - 30days (13 February to 14 March)

1	2	3	4	5	6	7	8	9	10	11
(13 Feb)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
12	13	14	15	16	17	18	19	20	21	22
(24)	(25)	(26)	(27)	(28)	(1Mar)	(2)	(3)	(4)	(5)	(6)
23	24	25	26	27	28	29	30			
(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)			

12. Caitra - 30 days (15 March to 13 April)

1	2	3	4	5	6	7	8	9	10	11
(15 Mar)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
12	13	14	15	16	17	18	19	20	21	22
(26)	(27)	(28)	(29)	(30)	(31)	(1 Apr)	(2)	(3)	(4)	(5)
23	24	25	26	27	28	29	30			
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)			

At Leap Years

When leap years occur, Phālguṇa will have 31 days, and then in these years the relationship of the dates of the months of Phālguṇa with those of the corresponding months of the Gregorian calendar will change for a period of only 15 days from 17 to31 Phālguṇa as shown below:

Phālguṇa - 31 days (13 February to 14 March)

1	2	3	4	5	6	7	8	9	10	11
(13 Feb)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
12	13	14	15	16	17	18	19	20	21	22
(24)	(25)	(26)	(27)	(28)	(29)	(1Mar)	(2)	(3)	(4)	(5)
23	24	25	26	27	28	29	30	31		
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)		

Note: The relationship between the days of the months of the all-India *nirayaṇa* calendar and those of the Gregorian calendar will change by a day when additional leap years will occur at considerable intervals in the *nirayaṇa* calendar, and also in century years not divisible by 400.

Annexure II

Method of keeping the year of the Sidereal Solar Calendar corrected by normal and additional leap years

Besides normal leap years occuring at 4-year cyclic intervals which will be Kali era year divisible by four including century years, there will occur additional leap years at cyclic intervals of 156 years from the first one that will occur at 78th year from the start of the calendar.

	1	2	3	4	5	6	7
	Sl. No	Year from Start	Correction needed to' nirayaṇa years counted as 365 days	Correction by. normal leap years	Correction by additional leap years	Cumulative error before making correction by leap years (4 or 5)	Error positipn after correction by leap years
			Days	Days	Days	Days	Days
α	1.	76	19.483	19	-	+1.483	+0.483
*	2.	78	19.996	19	1	+0.996	-0.004
α	3.	80	20.509	20	1	+0.509	-0 491
α	4.	156	39.992	39	1	+0.992	-0.008
*	5	234	59.988	58	2	+0.998	-0.002
α	6.	388	99.468	97	2	+1 :468	+0 468
	7.	390	99.980	97	3	+0.980	-0.020
α	8.	392	100.493	98	3	+0.493	-0.507
α	9.	1012	259.436	253	6	+1.436	+0.436
*	10.	1014	259.949	253	7	+0.949	-0.051
α	11	1016	260 462	254	7	+0.462	-0.538
α	12.	2104	539 381	526	13	+1.381	+0.381
*	13.	2106	539 894	526	14	+0.894	-0.106
α	14.	2108	540.407	527	14	+0.407	-0.593
α	15.	3040	779 334	760	19	+1.344	+0.344
*	16.	3042	779.847	760	20	+0.847	-0.153
α	17.	3044	780.360	761	20	+0.360	-0.640
α	18.	4600	1179.256	1150	29	+1.256	+0.256
*	19.	4602	1179.768	1150	30	+0.768	-0.232
α	20.	4604	1180.281	1151	30	+0.281	-0.719
α	21.	6004	1539.185	1501	38	+1.185	+0.185
*	22.	6006	1539.698	1501	39	+0.698	-0.302
α	23.	6008	1540.211	1502	39	+0.211	-0.789
α	24.	9904	2538 989	2476	63	+0.989	-0 011
*	25.	9906	2539.502	2476	64	+0.502	-0.498

Note: a) * sign indicates that the year is an additional leap year; b) α sign indicates that the year is a normal leap year, c) Error remaining after making correction is prefixed by sign '+', d) Error corrected in excess is prefixed by sign '-', e) The starting year of the calendar is to be taken as 5101 Kali irrespective to the year of its introduction. f) To reckon the years which will be additional leap years, multiply 78 by odd numbers serially starting from 1, that is by 1,3,5 etc., and the product obtained will be the required year counted from the start of the calendar. Thus these years will be . 1 x 78 = 78; 3 x 78 = 234; 5x78 = 390; etc , and the respective kali year where additional leap years will occur will be 5178, 5334, 5490, etc.

Remark: This method of hav ing additional leap years keeps the year length best adusted.

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