Calendars

Contents

1) INTRODUCTION:

A calendar is a system of organizing days. This is done by giving names to periods of time, typically days, weeks, months and years. A date is the designation of a single, specific day within such a system.

Gregorian calendar is the most widely used calendar across the world and we in India as well use it as a national calendar.

In LR section, questions on calendar are very frequently asked. This is one of the easiest topics once we get hang of how the Gregorian calendar is constructed, how the leap year is incorporated and how it affects days of various years.

2) GREGORIAN CALENDAR:

In this type of calendar, a day is basic unit consisting of 24 hours (time Earth takes to complete one rotation around its own axis)

7 days make a week and

365 days (usually) make a year.

A year is the time Earth takes to complete one revolution around the Sun. To be precise, actual time for one revolution is **365 days, 5 hours, 59 minutes and 16 seconds**.

So, every four years, to incorporate this extra 6 hours occurring every year, we add an extra day in the calendar every 4 years. We call such a year a LEAP YEAR.

So, leap year has 366 days instead of 365. It occurs in a year which is divisible by 4. (What is test for divisibility by 4?)

List down other 2-digit numbers divisible by 4.

So, 1948, 2016, 2224 – are all examples of leap year.

However, there's a catch. We're rounding off 5 hours, 59 minutes and 16 seconds to 6 hours. We're essentially adding little extra every 4 years.

To compensate for that, we don't add an extra day if year is a multiple of 100 unless it is multiple of 400.

So, 1900 is NOT a leap year even though it is divisible by 4 as it is NOT divisible by 400. But, 1600 is a leap year and so is 2000.

Examples: Which of the following are leap year?
1. 2022
2. 2020
3. 2024
4. 2030
5. 1234
6. 2345
7. 8573
8. 8888
9. 2424
10. 2009

11. 1000
12. 12000
13. 3400
14. 2348
15. 9998
16. 10000
17. 1212
18. 1256
19. 200
20. 3000

Number of days in a month:

January	31	July	31
February	28 or 29	August	31
March	31	September	30
April	30	October	31
May	31	November	30
June	30	December	31

3) DIVIDING BY 7 – CONCEPT OF 'EXTRA' DAYS

A week has 7 days and a day repeats every 8th day. So, if today 1st August is Sunday, there will be Sunday on 8th August, 15th August and so on.

So, in a month having 31 days, there shall be 4 full weeks and 3 extra days

In a month having 30 days, there shall be 4 full weeks and 2 extra days

In a month having 28 days there shall be 4 full weeks

In a month having 29 days there shall be 4 full weeks and 1 extra day

In a year having 365 days, there shall be 52 full weeks and 1 extra day

In a leap year with 366 days, there shall be 52 weeks and 2 extra days.

In 100 years (ending on non-leap year) there are 24 leap years and 76 normal years. So, there are 76 + 48 = 124 extra day which reduces to 5 extra days

In 200 years, there will 10 extra days which is reduced to 3 extra days

In 300 years, there will be 15 extra days which is reduced to 1 extra day

In 400 years, there will be 20 + 1 = 21 extra days (as 400 itself is leap year) which is reduced to 0 extra days

4) TYPES OF QUESTIONS:

1. Which day will be there after X days:

In this type, today's day is given and we're asked to find out which day will be there on X^{th} day or after X days.

Q. If today is Thursday, after 68 days, it will be __

Here, we only have to use the fact that there are 7 days in a week. We simply divide 68 by 7 and look at what is the remainder.

Note that, 63 is divisible by 7 and thus remainder is 5. So, it will be Tuesday.

Alternatively, 70 is divisible by 7. So, after 70 days it will be Thursday. Thus, going back two days, it will be Tuesday after 68 days.

Q. If today is Monday, what will be day after 1000 days?

Q. If today is Sunday, what will be day after 12345 days?

2. **Which day will be there after X years?**

In this type of questions, today's day will be given and we're to find out which day will be there after X years on the same date.

Here we again note that, there is <u>1 extra day in a normal year and 2 extra days in a leap year</u>.

Q. If today on 1st August 2022 it is Monday, what day will it be on 1st August 2023?

Only question we've to ask is there any involvement of leap year? Here clearly 2023 is NOT a leap year. So, between the given period of 1 year, only 1 extra day shall occur.

So, on 1st August 2023, it will be TUESDAY.

Q. If today on 1st January 2020 it is Wednesday, what day will it be on 1st January 2021?

Now, is there leap year involved? – YES, 2020 is a leap year and extra day of 29th February is between the given period. So, there are 2 extra days.

It will be Friday on 1st January 2021.

Q. If today on 1st August 2022 it is Monday, what day will it be on 1st August 2048?

We're asked day after exactly 26 years. We just need how many extra days occur in that period.

For that, we just need to find out how many leap years occur in this period.

It is clearly 7. So extra days are 19 + 7*2 = 19 + 14 = 33 which is same as 5.

So, it will be Saturday on 1st August 2048.

Q. If today on 1st January 2022 it is Saturday, what day will it be on 1st January 2048?

We again want to find out extra days in the period. Similar to above, how many leap years occur inside the period.

Does extra day of 29th February 2048 occur inside the period? – NO

So, actually only 6 leap years occur inside the given period.

Extra days = 20 + 6*2 = 32, which is same as 4.

So, it will be Wednesday.

Q. If today on 1st August 2022 it is Monday, what day will it be on 1st August 2099?

Q. If today on 1st August 2022 it is Monday, what day will it be on 1st August 3022?

NOTE that, this is a period of 100 years. We've to just look for how many leap years occur in this period. Is it 24 or 25?

When is number 24 and when is it 25?

Here it is 24. We already know that in such a case, there are 5 extra days. So, it will be Saturday.

Q. If today on 1st August 2022 it is Monday, what day will it be on 1st February 2030?

3. Which day was there on particular date in the past?

Here you're either given today's day or you may have to assume 1st January 0000 as a Monday if nothing is given. This is where extra days per 100, 200, 300, 400 years calculation we did above comes in handy.

Q. What was the day on 25th January, 1975?

NOTE: No other information is given. So, we use known information that is 1st January 0000 was Monday.

We also know that in 400 years there are 0 extra days. So, after 1600 years, there are no extra days.

1974 = 1600 + 300 + 74

In 300 years, there is 1 extra day.

In next 74 years, there are 18 leap years. So, extra days = 56 + 18*2 = 92. Which is same as 1 extra day.

So, after 1974 years there are 0 + 1 + 1 = 2 extra days. So, on 1st January 1975 it was Wednesday. Thus, on 22 January it was Wednesday.

Thus, on 25 January 1975 is was Saturday.

Q. What day of the week was 20th June 1837?

1836 complete years + first 5 months of the year 1837 + 20 days of June

1836 = 1600 + 200 + 36

In 1600 years – no extra days; In 200 years 3 extra days;

In 36 years, there are 9 leap years – 27+18 = 45 extra days – same as 3 extra days

First 5 months of 1837: 3+0+3+2+3 = 11 extra days – same as 4 extra days

In total: 0 + 3 + 3 +4= 10 extra days – same as 3 extra days

So, it was Thursday on 1st June 1837 and thus on 22nd June 1837.

So, it was Tuesday in 20th June 1837.

Q. If today 10th August is Wednesday, what is the day on 2nd February 1990?

Assume there was some day X on given day and move similarly with calculating extra days till 10th August 2022.

Ans. Friday

Q. The last day of a century cannot be ___

(a) Monday

(b) Wednesday

(c) Tuesday

(d) Friday

4. Repetition of calendar of particular year

In this type of questions, we are given a reference year and we're asked after what minimum time will this calendar will repeat in the future.

There are ONLY 14 different calendars possible in Gregorian system. So, calendar indeed repeats after certain number of years.

Solving Technique:

We look whether the given year is leap or not.

If not leap, then we look at the remainder year has when divided by 4.

YEAR	Repetition after years
Leap year	**28**
Leap year + 1 (4n + 1)	**6**
Leap year + 2	**11**
Leap year + 3	**11**

Q. After how many years will the calendar of 2001 repeat?

NOTE: 2001 is leap year+1 – So the calendar will repeat after 6 years i.e. 2007

Q. After how many years will the calendar of 2011 repeat?

2011 is leap year + 3: repeat after 11 years i.e. 2022

Q. After how many years will the calendar of 2013 repeat?

Q. After how many years will the calendar of 2022 repeat?

Q. After how many years will the calendar of 2035 repeat?

Q. After how many years will the calendar of 2040 repeat?

Q. After how many years will the calendar of 2072 repeat?

SPECIAL CASE: If leap year + 28 is NOT a leap year – In this case answer is +40

Thus, for 2072 – repetition will happen in 2012 after 40 years

Q. In case of following years find the year when the calendar repeats?

1. 1845
2. 1345
3. 9867

4. 3000
5. 1234
6. 2020
7. 3434
8. 1972
9. 2172
10. 2472
11. 7777
12. 1111
13. 2323
14. 7444
15. 860
16. 0000
17. 0001
18. 0040
19. 1212
20. 9091

5) PYQS:

CSE 2023: If today is Sunday, then which day is it exactly on 10^{10}th day?
(a) Wednesday (b) Thursday (c) Friday (d) Saturday

CSE 2022: Which date of June 2099 among the following is Sunday?
(a) 4
(b) 5
(c) 6
(d) 7

CSE 2021: Consider two Statements and a Question:
Statement 1: The last day of the month is a Wednesday.
Statement 2: The third Saturday of the month was the seventeenth day.
Question: What day is the fourteenth of the given month?
Which one of the following is correct in respect of the Statements and the Question?
(a) Statement 1 alone is sufficient to the answer of the Question
(b) Statement 2 alone is sufficient to answer the Question
(c) Both Statement 1 and Statement 2 are required to answer the Question
(d) Neither Statement 1 alone nor Statement 2 alone is sufficient to answer the Question

CSE 2021: Which day is 10th October,2027?

(a) Sunday

(b) Monday

(c) Tuesday

(d) Saturday

CSE 2021: From January 1, 2021, the price of petrol (in Rupees per litre) on mth day of the year is 80 + 0.1m, where m = 1, 2, 3, ..., 100 and thereafter remains constant. On the other hand, the price of diesel (in Rupees per litre) on nth day of 2021 is 69 + 0.15n for any n. On which date in the year 2021 are the prices of these two fuels equal?

(a) 21st May

(b) 20th May

(c) 19th May

(d) 18th May

CSE 2020: Q. In the particular year 12th January is a Sunday, then which one of the following is correct?

(a) 15th July is a Sunday if the year is a leap year.

(b) 15th July is a Sunday if the year is not a leap year.

(c) 12th July is Sunday if the year is a leap year.

(d) 12th July is a not Sunday if the year is a leap year.

CSE 2019: Which year has the same calendar as that of 2009?

(a) a.2018

(b) b. 2017

(c) c. 2016

(d) d. 2015

CSE 2019: Mr 'X' has three children. The birthday of the first child falls on the 5th Monday of April, that of the second one falls on the 5th Thursday of November. On which day is the birthday of his third child, which falls on 20th December?

(a) Monday

(b) Thursday

(c) Saturday

(d) Sunday

CSE 2019: In 2002, Meenu's age was one-third of the age of Meera, whereas in 2010, Meenu's age was half the age of Meera, what is Meenu's year of birth?

(a) 1992

(b) 1994

(c) 1996

(d) 1998

CSE 2017: If second and fourth Saturdays and ,all the Sundays are taken as only holidays for an office, what would be the minimum number of possible working days of any month of any year?
(a) 23
(b) 22
(c) 21
(d) 20

CSE 2014: If the 3rd day of a month is Monday, which one of the following will be the fifth day from 21st of this month?
(a) Monday
(b) Tuesday
(c) Wednesday
(d) Friday

6) COMPREHENSION

Private investment in general is volatile. Foreign private investment is more volatile because the available investment avenues are significantly greater (i.e., the entire world). Therefore, the responsibility of providing employment cannot be left to Foreign District Investment (FDI). The current FDI inflows are volatile over time and across sectors and regions, which is a necessary consequence of their search for the highest returns. The adverse consequences are unstable employment and an accentuation of income and regional inequalities. A probable positive consequence of foreign investment is the inflow of new technology and its subsequent diffusion. However, the technology diffusion is not at all certain because the existing state of physical and human capital in India may prove inadequate for the diffusion.
Q. With reference to the above passage, the following assumptions have been made:
1. Relying on foreign investment in the long run is not an economically sound policy.
2. Policies must be undertaken to reduce volatility in foreign private investment.
3. Policies must be undertaken to strengthen domestic private investment.
4. Public investment should be given priority over private investment.
5. Substantial public investment in education and health should be undertaken.
Which of the above assumptions is/are valid?
(a) 1, 2 and 4
(b) 1, 3 and 5
(c) 2, 4 and 5
(d) 3 only

Many opportunities to harness the highly skewed, seasonal and spatial distribution of monsoon floes, which occur in a four-month period from June to September annually, have been lost. Since these few months account for most of the rainfall and consequent freshwater availability, the need for holding rainwater in reservoirs, for subsequently releasing it for use over the year, is a necessity nobody can afford to overlook. Climate change will continue to

affect weather conditions and create water shortages and excesses. While millions suffer from droughts and floods, waters in the country's many rivers flow unutilized, and are discharged into the sea every year

Q. With reference to the above passage, which of the following could be the most rational and practical implications for India?

1. Inter-linking of rivers should be undertaken.
2. A network of dams and canals should be built across the country for proper distribution of water.
3. Farmers should be provided easy loans for digging borewells.
4. Usage of water for agriculture should be regulated by law.
5. Distribution of river water among regions should be regulated by the Union Government.

Select the correct answer using the code given below.

(a) 1 and 2
(b) 2, 4 and 5
(c) 1, 3 and 4
(d) 2, 3 and 5

In India, the segregation of municipal waste at source is rare. Recycling is mostly with the informal sector. More than three-fourths of the municipal budget goes into collection and transportation, which leaves very little for processing/resource recovery and disposal. Where does waste-to-energy fit into all this? Ideally it fits in the chain after segregation (between wet waste and rest), collection, recycling, and before getting to the landfill. Which technology is most appropriate in converting waste to energy depends on what is in the waste (that is biodegradable versus non-biodegradable component) and its calorific value. The biodegradable component of India's municipal solid waste is a little over 50 per cent, and bio-methanation offers a major solution for processing this.

Q. Based on the above passage, the following assumptions have been made:

1. Collection, processing and segregation of municipal waste should be with government agencies.
2. Resource recovery and recycling require technological inputs that can be best handled by private sector enterprises.

Which of the assumptions given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Q. Which one of the following statements best reflects the crux of the passage?
(a) Generation of energy from municipal solid waste is inexpensive.
(b) Bio-methanation is the most ideal way of generating energy from municipal solid waste.
(c) Segregation of municipal solid waste is the first step in ensuring the success of waste-toenergy plants.
(d) The biodegradable component of India's municipal solid waste is not adequate to provide energy from waste efficiently/effectively.