IAS PRELIMS 2020
Solved Paper-II

Maximum Marks : 200   **Time Limit : 2Hr.**

1. A man walks down the backside of his house straight 25 metres, then turns to the right and walks 50 metres again; then he turns towards left and again walks 25 metres. If his house faces to the East, what is his direction from the starting point?
   (a) South-East   (b) South-West
   (c) North-East   (d) North-West

2. Two Statements are given followed by two Conclusions:
   Statements:
       All numbers are divisible by 2.
       All numbers are divisible by 3.
   Conclusion-I:
       All numbers are divisible by 4.
   Conclusion-II:
       All numbers are divisible by 4.
   Which of the above Conclusions logically follows/follow from the two given Statements?
   (a) Only Conclusion-I
   (b) Only Conclusion-II
   (c) Neither Conclusion-I nor Conclusion-II
   (d) Both Conclusion-I Conclusion-II

3. Two Statements are given followed by two Conclusions:
   Statements:
       All cats are dogs.
       All cats are black.
   Conclusion-I:
       All dogs are black
   Conclusion-II:
       Some dogs are not black.

   Which of the above Conclusions logically follows/follow from the two given Statements, disregarding commonly known facts?
   (a) Only Conclusion-I
   (b) Only Conclusion-II
   (c) Neither Conclusion-I nor Conclusion-II
   (d) Both Conclusion-I and Conclusion-II

4. Consider the following sequence of numbers :
   5 1 4 7 3 9 8 5 7 2 6 3 1 5
                 8 6 3 8 5 2 2 4 3 4 9 6
   How many odd numbers are followed by the odd number in above sequence?
   (a) 5   (b) 6
   (c) 7   (d) 8

5. A is 16th from the left end in a row of boys and V is 18th from the right end. G is 11th from A towards the right and 3rd from V towards the right end. How many boys are there in the row?
   (a) 40
   (b) 41
   (c) 42
   (d) Cannot be determined due to insufficient data

6. Three Statements S1, S2 and S3 are given below followed by a Question:
   S1: C is younger than D, but older than A and B.
   S2: D is the oldest.
   S3: A is older than B.
   Question:
   Who among A, B, C and D is the youngest?

Which one of the following is correct in respect of the above Statements and the Question?
(a) S1 alone is sufficient to answer the Question.
(b) S1 and S2 together are sufficient to answer the Question.
(c) S2 and S3 together are sufficient to answer the Question.
(d) S1 and S3 together are sufficient to answer the Question.

7. How many integers are there between 1 and 100 which have 4 as a digit but are not divisible by 4?
   (a) 5   (b) 11
   (c) 12   (d) 13

8. Let x, y be the volumes; m, n be the masses of two metallic cubes P and Q respectively. Each side of Q is two times that of P and mass of Q is two times that of P. Let $u = m/x$ and $v = n/y$. Which one of the following is correct?
   (a) $u = 4v$ (b) $u = 2v$
   (c) $v = u$ (d) $v = 4u$

9. The average age are of a teacher and three students is 20 years. If all the three students are of same age and the difference between the age of the teacher and each student is 20 years, then what is the age of the teacher?
   (a) 25 years   (b) 30 years
   (c) 35 years   (d) 45 years

10. A person bought a car and sold it for ₹ 3,00,000. If he incurred a loss of 20%, then how much did he spend to buy the car?
    (a) ₹ 3,60,000   (b) ₹ 3,65,000
    (c) ₹ 3,70,000   (d) ₹ 3,75,000

Direction for the following 7 (seven) items:
Read the following **five passages** and answer the items that follow. Your answers to these items should be based on the passages only.

Passage–1
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 Direct 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.

11. 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

Passage–2
Many opportunities to harness the highly skewed, seasonal and spatial distribution of monsoon flows, 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.

12. 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

Passage–3
People will invest in education whenever they are granted the economic freedom to fully enjoy its benefits. Again, this is for the obvious reason that the return on education increases as the level of economic freedom rises. When people, thanks to lower tax rates, are allowed to retain most of the higher income that they gain from each incremental level of education, it makes eminent sense to invest in education. On the other hand, when the government decides to tax the higher income of educated individuals at even higher rates, it makes very little sense to invest in educating oneself further. The same incentives apply to parents who decide on whether to invest in their children's education.

13. With reference to the above passage, the following assumptions have been made:
    1. Lower tax rates in a country invariably translate into greater investments in higher education.
    2. Investment in the education of children ensures their economic freedom.
    3. Economic freedom has a positive impact on building up human capital.
    Which of the above assumptions is/are valid?
    (a) 1 only   (b) 2 only
    (c) 3 only   (d) 1, 2 and 3

Passage–4

Our urban bodies cannot possibly ensure sustainable delivery of water in our cities unless financing mechanisms are put in place. Water delivery requires heavy investment in collecting it from a natural source, treating it to make it potable, and laying a distribution network of pipes for delivery to the users. It also requires investments in sewerage infrastructure and sewage treatment plants so that the sewers can carry the wastewater to these plants to ensure that no untreated sewage is discharged back into natural water bodies. If our cities were rich enough to meet the entire cost, water could be delivered free. They are not.

14. What is the **most logical and crucial message** conveyed by the passage?
    (a) Urban local bodies must recover costs through user charges.
    (b) Urban local bodies are not efficient enough to meet the water requirements of our cities.
    (c) Water shortage in our cities is a perennial problem that cannot be solved.
    (d) In view of the water crises in our cities, there is an urgent need to limit the population of cities by adopting an upper limit of population size.

15. Withe reference to the above passage, the following assumptions have been made:
    1. Rich cities only can ensure sustainable delivery of water.
    2. Sustainable delivery of water in cities means much more than supplying water to household.
    Which of the above assumptions is/are valid?
    (a) 1 only   (b) 2 only
    (c) Both 1 and 2   (d) Neither 1 nor 2

Passage–5

In India, agriculture still engages about half of its workforce, and about 85 percent of its farms are small and marginal. Compared to China and Vietnam, which have experienced fast structural and rural transformation, India's story is of slow transformation. As a result, poverty reduction in India was at a much slower pace during 1988–2014, compared to China and Vietnam. India's poverty reduction was slow during 1988–2005, but during 2005–2012, it accelerated dramatically–almost three times faster than during the earlier period. What did India do during this period? Research reveals that the relative price scenario changed significantly (by more than 50%) in favour of agriculture in the wake of rising global prices. This boosted private investments in agriculture by more than 50%. As a result, agri-GDP growth touched 4.1% during 2007–2012 as against 2.4% during 2002–2007. The net surplus of agri-trade touched $25 billion in 2013–2014; real farm wages rose by 7% per annum. All this led to unprecedented fall in poverty.

16. With reference to the above passage, the following assumptions have been made:
    1. Structural and rural transformation is impossible when farms are mainly small and marginal.
    2. A good price incentive can trigger investments in agriculture.
    3. India needs to build value chains for high-value agri-products like livestock and horticulture.
    4. Higher global prices of agricultural commodities are essential for India's poverty reduction.

Which of the above assumptions are valid?
(a) 1 and 3   (b) 2 and 4
(c) 2 and 3   (d) 3 and 4

17. Which one of the following statements **best reflects the critical message** of the passage?
    (a) India should created large-scale off-farm rural employment to reduce poverty in the near future.
    (b) India should create a large number of farmer producer companies.
    (c) Private investment in agriculture should be given priority over public investment.
    (d) Inclusive agricultural growth is key to reduce poverty in the near future.

18. Two Statements S1 and S2 are given below with regard to four numbers P, Q, R and S followed by a Question:
    S1: R is greater than P as well as Q.
    S2: S is not the largest one.
    Question:
    Among four numbers P, Q, R and S, which one is the largest?
    Which one of the following is correct in respect of the above Statements and the Question?
    (a) S1 alone is sufficient to answer the Question.
    (b) S2 alone is sufficient to answer the Question.
    (c) S1 and S2 together are sufficient to answer the Question, but neither S1 alone nor S2 alone is sufficient to answer the Question.
    (d) S1 and S2 together are not sufficient to answer the Question.

19. Two Statements S1 and S2 are given below followed by a Question:
    S1: n is a prime number.
    S2: n leaves a remainder of 1 when divided by 4.
    Question:
    If n is a unique natural number between 10 and 20, then what is n?
    Which one of the following is correct in respect of the above Statements and the Question?
    (a) S1 alone is sufficient to answer the Question.
    (b) S2 alone is sufficient to answer the Question.
    (c) S1 and S2 together are sufficient to answer the Question, but neither S1 alone nor S2 alone is sufficient to answer the Question.
    (d) S1 and S2 together are not sufficient to answer the Question.

20. Two Statements S1 and S2 are given below with regard to two numbers followed by a Question:
    S1: Their product is 21.
    S2: Their sum is 10.
    Question:
    What are the two numbers?
    Which one the following is correct in respect of the above Statements and the Question?
    (a) S1 alone is sufficient to answer the Question.
    (b) S2 alone is sufficient to answer the Question.
    (c) S1 and S2 together are sufficient to answer the Question, but neither S1 alone nor S2 alone is sufficient to answer the Question.
    (d) S1 and S2 together are not sufficient to answer the Question.

21. In the sum

$\otimes + 1 \otimes + 5 \otimes + \otimes \otimes + \otimes 1 = 1 \otimes \otimes$

for which digit does the symbol $\otimes$ stand?

(a) 2   (b) 3
(c) 4   (d) 5

22. If you have two straight sticks of length 7.5 feet and 3.25 feet, what is the minimum length can you measure?

(a) 0.05 foot   (b) 0.25 foot
(c) 1 foot   (d) 3.25 feet

23. A simple mathematical operation in each number of the sequence 14, 18, 20, 24, 30, 32, ... results in a sequence with respect to prime numbers. Which one of the following is the next number in the sequence?

(a) 34   (b) 36
(c) 38   (d) 40

24. One page is torn from a booklet whose pages are numbered in the usual manner starting from the first page as 1. The sum of the numbers on the remaining pages is 195. The torn page contains which of the following numbers?

(a) 5, 6   (b) 7, 8
(c) 9, 10   (d) 11, 12

25. Consider the following arrangement that has some missing letters:

abab_b_bcb_dcdcded_d

The missing letters which complete the arrangement are

(a) a, b, c, d   (b) a, b, d, e
(c) a, c, c, e   (d) b, c, d, e

26. Let A3BC and DE2F be four-digit numbers where each letter represents a different digit greater than 3. If the sum of the numbers is 15902, then what is the difference between the values of A and D?

(a) 1   (b) 2
(c) 3   (d) 4

27. Two Statements S1 and S2 are given below followed by a Question:

S1: There are not more than two figures on any page of a 51-page book.

S2: There is at least one figure on every page.

Question:

Are there more than 100 figures in that book?

Which one of the following is correct in respect of the above Statements and the Question?

(a) Both S1 and S2 are sufficient to answer the Question, but neither S1 alone nor S2 alone is sufficient to answer the Question.

(b) S1 alone is sufficient to answer the Question.

(c) S1 and S2 together are not sufficient to answer the Question.

(d) S2 alone is sufficient to answer the Question.

28. Consider the following data:

	Average marks in English	Average marks in Hindi
Girls	9	8
Boys	8	7
Overall average marks	8.8	x

What is the value of x in the above table?

(a) 7.8   (b) 7.6
(c) 7.4   (d) 7.2

29. A family of two generations consisting of six members P, Q, R, S, T and U has three males and three females. There are two married couples and two unmarried siblings. U is P's daughter and Q is R's mother-in-law. T is an unmarried male and S is a male. Which one of the following is correct?

(a) R is U's husband.   (b) R is S's wife.
(c) S is unmarried.   (d) None of the above

30. If in a particular year 12th January is a Sunday, then which one the following is correct?

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

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

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

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

Directions for the following 6 (six) items:

Read the following five passages and answer the items that follow. Your answers to these items should be based on the passages only.

Passage–1

In India, over the last decade or so, labour has been departing agriculture, but is only going to construction and unregistered manufacturing which are not markedly better jobs. Services, where labour tends to be most productive, are not generating the additional jobs the country needs. India will need 24 million or so jobs over the next decade. The new sector, e-commerce, can at best close only half the jobs gap. Only those sectors that drive domestic demand such as health and education can comfortably fill the other half.

31. Which one the following is **best implied** in the passage?

(a) Strong measures need to be taken to reduce the rural to urban migration of labour.

(b) The working condition in construction and unregistered manufacturing needs to be improved.

(c) Service sector has been reducing the problem of unemployment.

(d) Increased social sector spending is imperative for large-scale job creation.

Passage–2

In India, the current focus on the right to privacy is based on some new realities of the digital age. A right is a substantive right only if it works in all situations, and for everyone. A right to free expression for an individual about her exploitation, for instance, is meaningless without actual availability of security that guarantees that private force cannot be used to thwart this right. The role of the State, therefore, is not just to abstain from preventing rightful free expression, but also to actively ensure that private parties are not able to block it.

32. On the basis of the above passage, the following assumptions have been made:

1. State should have some institutions to ensure its appropriate role in a digital society.

2. State should ensure that private parties do not violate the citizens' right to privacy.

3. Digital economy is not compatible with the idea of not violating the citizens' privacy.

Which of the above assumptions is/are valid?

(a) 1 and 2   (b) 3 only
(c) 1 and 3   (d) 2 only

Passage–3

One of the biggest ironics around water is that it comes from rivers and other wetlands. Yet it is seen as divorced from them. While water is used as a resource, public policy does not always grasp that it is a part of the natural ecosystem. Efforts at engineering water systems are thus efforts at augmenting water supply rather than strengthening the capacities of ecological systems.

33. Which one the following is the **most logical and rational inference** that can be made from the above passage?
   (a) Rivers and other wetlands should be protected under Ramsar Convention.
   (b) Engineering water systems should be modernized and further augmented.
   (c) Wetlands need to be reinforced as more than just open sources of water.
   (d) Water supply should not be free of cost so as to prevent its misuse or overuse.

Passage–4

Asset allocation is the most important investment decision we will ever make, and sadly, most of us do not give that decision the importance it deserves. We are adamant about seeking predictability with our future. We tend to thing of investing in risky assets as extremely volatile and value cording. We also dislike fluctuating returns and the loss of control of investment. We think our money is best left idle, unproductive but safe. There is no asset that is risk-free. We could lose our jobs, our homes can lose value, our banks can go bankrupt, our bonds can default, the government can collapse and companies we chose fondly may cease to exist. But we cannot live life assuming that all these extreme events are waiting to happen, and all at the same time. All these extreme forms of risks we know will not manifest at the same time.

34. Which one of the following statements **best implies** the suggestion given by the author of the passage?
   (a) Distribute your wealth across different kinds of assets so that your risks would be minimized.
   (b) Risk-taking behaviour should be a necessary component of you personality if you want to generate wealth.
   (c) While making investments, find a trustworthy asset management organisation which would manage your wealth for you.
   (d) You should know that investing your money is a risky business.

Passage–5

Although most of the Genetically Modified (GM) crops cultivated now are genetically engineered for a single trait, in future, crops genetically engineered for more than one trait will be the norm. Thus, biotechnology's role in agriculture and the regulation of the same cannot be understood solely in the context of the current generation of GM crops. Instead, there is a need to take a comprehensive look, taking into account various aspects, including socio-economic impacts, so that the potential of the technology can be harnessed while minimizing negative impacts. Given the importance of biotechnology in developing varieties that can help in climate change mitigation and adaptation, not using biotechnology as a part of the climate change action plan.

Domestic regulation of biotechnology cannot be viewed in isolation of trade policy and obligations under various international treaties and conventions.

35. With reference to the above passage, the following assumptions have been made:
   1. Biotechnology regulation is an evolving process.
   2. Participation of people is needed in policy decisions regarding biotechnology regulation.
   3. Biotechnology regulation should take into account socio-economic aspects in decision-making.
   4. Wider involvement of political executive in biotechnology regulation improves its effectiveness in dealing with the country's trade policies and international obligations.

   Which of the above assumptions are valid?
   (a) 1, 2 and 4 only   (b) 1 and 3 only
   (c) 2, 3 and 4 only   (d) 1, 2, 3 and 4

36. Which one of following statements **best implies the crux** of the passage?
   (a) Precautionary principle is not given importance in current debate on developing GM crops.
   (b) Biotechnology is not currently used in climate change mitigation and adaptation mechanisms.
   (c) Biotechnology's role is not confined to the current priorities of developing GM crops.
   (d) The negative impacts of biotechnology are not properly understood.

37. How many zeroes are there at the end of the following product?
   $1 \times 5 \times 10 \times 15 \times 20 \times 25 \times 30 \times 35 \times 40 \times 45 \times 50 \times 55 \times 60$
   (a) 10   (b) 12   (c) 14   (d) 15

38. Let XYZ be a three-digit number, where $(X + Y + Z)$ is not a multiple of 3. Then $(XYZ + YZX + ZXY)$ is **not** divisible by
   (a) 3   (b) 9
   (c) 3   (d) $(X + Y + Z)$

39. Let p, q, r and s be natural numbers such that
   $p - 2016 = q + 2017 = r - 2018 = s + 2019$
   Which one of the following is the largest natural number?
   (a) p (b) q (c) r (d) s

40. How many five-digit prime numbers can be obtained by using all the digits 1, 2, 3, 4 and 5 without repetition of digits?
   (a) Zero   (b) One   (c) Nine   (d) Ten

41. A person X can complete 20% of work in 8 days and another person Y can complete 25% of the same work in 6 days. If they work together, in how many days will 40% of the work be completed?
   (a) 6   (b) 8
   (c) 10   (d) 12

42. A car travels from a place X to place Y at an average speed of v km/hr, from Y to X at an average speed of $2v$ km/hr, again from X to Y at an average speed of $3v$ km/hr and again from Y to X at an average speed of $4v$ km/hr. Then the average speed of the car for the entire journey
   (a) is less than v km/hr
   (b) lies between v and $2v$ km/hr
   (c) lies between $2v$ and $3v$ km/hr
   (d) lies between $3v$ and $4v$ km/hr

43. Consider the following statements:
1. The minimum number of points of intersection of a square and a circle is 2.
2. The maximum number of points of intersection of a square and a circle is 8.
    Which of the above statements is/are correct?
    (a) 1 only   (b) 2 only
    (c) Both 1 and 2   (d) Neither 1 nor 2

44. A man takes half time in rowing a certain distance downstream than upstream. What is the ratio of the speed in still water to the speed of current?
(a) 1 : 2   (b) 2 : 1
(c) 1 : 3   (d) 3 : 1

45. How many pairs of natural numbers are there such that the difference of whose squares is 63?
(a) 3   (b) 4
(c) 5   (d) 2

46. Which one of the following will have minimum change in its value if 5 is added to both numerator and the denominator of the fractions $\frac{2}{3}, \frac{3}{4}, \frac{4}{5}$ and $\frac{5}{6}$?
(a) $\frac{2}{3}$ (b) $\frac{3}{4}$
(c) $\frac{4}{5}$ (d) $\frac{5}{6}$

47. A digit $n > 3$ is divisible by 3 but not divisible by 6. Which one of the following is divisible by 4?
(a) $2n$ (b) $3n$
(c) $2n + 4$ (d) $3n + 1$

48. If 1 litre of water weighs 1 kg, then how many cubic millimetres of water will weigh 0.1 gm?
(a) 1   (b) 10
(c) 100   (d) 1000

49. A vessel full of water weighs 40 kg. If it is one-third filled, its weight becomes 20 kg. What is the weight of the empty vessel?
(a) 10 kg   (b) 15 kg
(c) 20 kg   (d) 25 kg

50. A frog tries to come out of a dried well 4.5 m deep with slippery walls. Every time the frog jumps 30 cm, slides down 15 cm. What is the number of jumps required for the frog to come out of the well?
(a) 28   (b) 29
(c) 30   (d) 31

Directions for the following 6 (six) items:
Read the following **five passages** and answer the items that follow. Your answers to these items should be based on the passages only.

Passage–1
Bank credit to the industrial sector has started shrinking. Its decline has been a serious concern as credit growth is essential to revive investment. The problem's origins lie in the incomplete reforms of the last 25 years. An institutional change that should have followed the 1991 reforms should have been setting up of a resolution corporation for banks. In a market economy with booms and busts, banks should be allowed to be set up and to fall.

Today, we cannot shut down banks because there is no proper system to shut them down. Weak loss-making banks continue to need more capital.

51. Which one of the following is the **most logical and rational inference** that can be made from the above passage?
(a) Indian banking system is not able to help the country in its economic growth.
(b) Economic reforms that started in 1991 have not helped in improving the economy to expected levels.
(c) India lacks the institutional mechanism to deal with the failure of banks.
(d) Encouraging the foreign investments in our industrial sector is a good alternative to this sector's dependence on banks for credit.

Passage–2
India has tremendous potential for solar energy. We all realize that we have to stop burning fossil fuels to meet our energy needs. But certain renewable resources are still going through their cost curves and learning curves to get required amount of output. The Indian Government has strongly committed to its targets of reducing emissions by 33 percent by 2030, and towards this it has initiated a strong push towards a gas-based economy and has also invested heavily in renewable energy. However, business housed are wary of investing too heavily in renewable energy at a time when the technology is not yet ready.

52. Which one the following is the **most logical and rational inference** that can be made from the above passage?
(a) India's commitment to reduce emissions by 33% is unlikely to achieved.
(b) India should import gas rather than invest in renewable resources.
(c) Getting renewable resources to market too soon may be costly.
(d) India should put in more efforts in the exploration of natural gas.

53. With reference to the above passage, the following assumptions have been made:
1. Governments often provide inefficient and costly subsidies for technologies that may not be ready in the near future.
2. India's commitment of reducing emissions by 33% by 2030 shall be on the basis of gas-based economy.
    Which of the above assumptions is/are valid?
    (a) 1 only   (b) 2 only
    (c) Both 1 and 2   (d) Neither 1 nor 2

Passage–3
Genome editing is different from genome modification. Genome editing typically involves finding the part of a plant genome that could be changed to render it less vulnerable to disease, or resistant to certain herbicides, or to increase yields, Researchers use 'molecular scissors' to dissect the genome and repair it, which is a process that occurs naturally when plants are under attack from diseases and can throw up new mutations that enable the plant to survive future attacks. This evolutionary process can effectively be speeded up now that it is possible to examine plant genomes in detail in laboratories, and created mechanisms through which the relevant genes can be altered very precisely.

54. With reference to the above passage, the following assumptions have been made:
1. Genome editing does not require the transfer of genes from one plant to another.
2. Through genome editing, the chosen genes can be altered precisely in a manner akine to the natural process that helps plants to adapt to the environmental factors.

Which of the above assumptions is/are valid?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Passage–4

Many people understand the connection between solid waste management and health in terms of the consequences of unattended heaps of dry garbage which become home for flies and other vermin. However, there is another aspect that is not well-understood, that is, what happens when unscientific solid waste management combines with poor drainage and dumping of untreated sewage into drain which are meant to carry storm water during rains. The result is choked drains which are full of stagnant water breeding mosquitoes, resulting in the spread of water-borne disease.

55. In the context of India, which one of the following statements **best reflects the critical message** of the passage?
(a) In India, the drainage networks are not separate for sewerage and storm water.
(b) Urban local bodies do not have enough resource and legislative authority to deal with the problems of waste management.
(c) Solid waste management should be integrated with the maintenance of drainage and sewerage networks.
(d) Bad management of solid waste and sewerage systems by our municipalities is the reason for drinking water shortages in our cities.

Passage–5

In Part III of the Constitution, which assures people certain fundamental rights, Article 25 proclaims that "all persons are equally entitled to freedom of conscience and the right freely to profess, practise and propagate religion". What people fail to notice is that this proclamation is prefixed with the words "subject to public order, morality, health and to the other provisions of this Part", which set conditions precedent for the legal protection of religious practices of any community. The closing words of this prefatory rider in Article 25 virtually constitute a subordination clause placing other fundamental rights mentioned in Part III over and above the right to religious freedom. Among those other fundamental rights is the right to equality before law and equal protection of laws–assured at the outset and elaborated in later articles to mean, inter alia, that the State shall not deny equal protection of laws to any person or group of persons on the basis of religion alone.

56. What is the most logical inference from the above passage?
(a) State shall not interfere with the religious affairs of the citizens.
(b) Religious freedom under the Constitution is open to State intervention.
(c) Religious freedom of the citizens is not covered under fundamental rights.
(d) Religious practices of any community are immune to State laws.

57. How many different 5-letter words (with or without meaning) can be constructed using all the letters of the word 'DELHI' so that each word has to start with D and end with I?
(a) 24
(b) 18
(c) 12
(d) 6

58. A bottle contains 20 litres of liquid A., 4 litrs of liquid A is taken out of it and replaced by same quantity of liquid B. Again 4 litrs of the mixture is taken out and replaced by same quantity of liquid B. What is the ratio of quantity of liquid A to that of liquid B in the final mixture?
(a) 4 : 1
(b) 5 : 1
(c) 16 : 9
(d) 17 : 8

59. The average score of a batsman after his 50th innings was 46.4. After 60th innings, his average score increases by 2.6. What was his average score in the last ten innings?
(a) 122
(b) 91
(c) 62
(d) 49

60. As a result of 25% hike in the price of rice per kg, a person is able to purchase 6 kg less rice for ₹1,200. What was the original price of rice per kg.
(a) ₹ 30
(b) ₹ 40
(c) ₹50
(d) ₹60

61. What is the greatest length x such that $3\frac{1}{2}$ m and $8\frac{3}{4}$ m are integral multiples of x ?
(a) $1\frac{1}{2}$ m
(b) $1\frac{1}{3}$ m
(c) $1\frac{1}{4}$ m
(d) $1\frac{3}{4}$ m

62. Consider the following data:

Year	Birth rate	Death rate
1911–1921	48.1	35.5
1921–1931	46.4	36.3
1931–1941	45.2	31.2
1941–1951	39.9	27.4
1951–1961	41.7	22.8
1961–1971	41.1	18.9
1971–1981	37.1	14.8

For which period was the natural growth rate maximum?
(a) 1911–1921
(b) 1941–1951
(c) 1961–1971
(d) 1971–1981

63. The recurring decimal representation 1.272727 ... is equivalent to
(a) 13/11
(b) 14/11
(c) 127/99
(d) 137/99

64. What is the least four-digit number when divided by 3, 4, 5 and 6 leaves a remainder 2 in each case?
(a) 1012
(b) 1022
(c) 1122
(d) 1222

65. In adult population of a city, 40% men and 30% women are married. What is the percentage of married adult population if no man marries more than one woman and no woman marries more than one man; and there are no widows and widowers?
(a) $33\frac{1}{7}$ %
(b) 34%
(c) $34\frac{2}{7}$ %
(d) 35%

66. What is the remainder when $51 \times 27 \times 35 \times 62 \times 75$ is divided by 100?
    (a) 50   (b) 25
    (c) 5   (d) 1

67. A sum of ₹2,500 is distributed among X, Y and Z in the ratio $\dfrac{1}{2} : \dfrac{3}{4} : \dfrac{5}{6}$. What is the difference between the maximum share and the minimum share?
    (a) ₹ 300   (b) ₹ 350
    (c) ₹ 400   (d) ₹ 450

68. For what value of n, the sum of digits in the number $(10^n + 1)$ is 2?
    (a) For $n = 0$ only
    (b) For any whole number n
    (c) For any positive integer n only
    (d) For any real number n

69. In a class, there are three groups, A, B and C. If one student from group A and two students from group B are shifted to group C, then what happens to the average weight for the students of the class?
    (a) It increases.
    (b) It decreases.
    (c) It remains the same.
    (d) No conclusion can be drawn due to insufficient data.

70. How many different sums can be formed with the denominations ₹ 50, ₹100, ₹200, ₹ 500 and ₹2,000 taking at least three denominations at a time?
    (a) 16   (b) 15
    (c) 14   (d) 10

Directions for the following 6 (six) items:

Read the following **five passages** and answer the items that follow. Your answers to these items should be based on the passages only.

Passage–1

Spanish ships in the late 16th century first brought the potato tuber from South America to Europe whereby in the early 19th century, it had become a reliable backup to cereal crops, particularly in the cold, rain-soaked soils of Ireland. The Irish were soon almost wholly dependent on the potato as their staple food. And they were planting primarily one prodigious variety, the 'Lumper' potato, whose genetic frailty would be cruelly exposed by the fungus 'Phytophthora infestans'. In 1845, spores of the deadly fungus began spreading across the country, destroying nearly all the Lumpers in its path. The resulting famine killed or displaced millions.

71. Which one of the following statements **best reflects the critical message** of the passage?
    (a) For introducing any foreign plant into a country, the soil and climate conditions of that country should be suitable.
    (b) As a staple food of a country, tuber crops like potato connot replace cereal crops.
    (c) Some of the fungal infections of plants cannot be prevented or stopped from spreading across large areas.
    (d) Relying on a homogeneous food source is not desirable.

Passage–2

India is at once among the fastest growing global economies and home to the largest number of malnourished children in the world. There are regions where malnutrition is not the exception but the norm. And across the country, malnutrition is the cause of death for roughly half the 1.3 million children who die before their fifth birthday each year. Even those children who survive suffer permanently from the damage that has already been done to their bodies and minds from not getting enough of the right foods and nutrients. Around 44 million children under 5 are stunted. That makes it harder for them to learn in school and subsequently earn a living as adults. Their lifetime earnings potential is almost a quarter less than that of their healthy peers.

72. With reference to the above passage, which of the following is/are the **most rational and practical implication/implications**?
    1. India's Public Distribution System should be monitored by the Union Government.
    2. Girls should be encouraged to delay marriage and first pregnancy.
    3. Mothers should be encouraged to breast feed their children immediately after birth.
    4. The supply of safe drinking water and proper sanitation facilities to all should be ensured.
    5. Authorities should ensure the vaccination as prescribed.

Select the correct answer using the code given below.
    (a) 1, 2, 3 and 4   (b) 2, 3, 4 and 5
    (c) 1 only   (d) 3 and 5 only

Passage–3

The pulse variety 'Pusa Arhar 16' has the potential to be grown in the paddy-growing regions of Punjab, Haryana and Uttar Pradesh and eventually in all of India. Its yield (about 2000 kg/ hectare) will be significantly greater than those of the existing varieties and because its size will be uniform, it will be amenable to mechanical harvesting, an attractive feature for farmers in northern. India who currently use this technology for paddy. Most important, Arhar straw, unlike paddy straw, is green and can be ploughed back into the soil. In paddy straw, the problem is the high silica content, which does not allow for easy decomposition. In the case of Arhar, the farmer, even after combine harvesting, just needs to run a rotovator to cut the leftover straw into pieces, which can be ploughed back and will decompose very fast. All this is difficult with leftover paddy stalks that cannot be easily salvaged or ploughed back. Farmers, therefore, choose the easiest option of simply burning it.

73. Which of the following are the **most rational inferences** that can be made from he passage?
    1. Farmers' income will be higher with pulse cultivation than with paddy cultivation.
    2. Pulse cultivation causes less pollution as compared to paddy cultivation.
    3. Pulse straw can be used to improve soil quality.
    4. In the context of northern Indian agriculture, paddy straw has no usefulness.
    5. Mechanized agriculture is the main cause for stubble burning.

Select the correct answer using the code given below.
    (a) 2, 3 and 5   (b) 1, 4 and 5
    (c) 2 and 3 only   (d) 1 and 4 only

Passage–4

In India, authorities always look to store the maximum amount of water in reservoirs during the monsoon season, which is then used for irrigation and generation of electricity during the summer months. It is an internationally accepted practice that the water level of a reservoir should be kept below a certain level before the onset of monsoon season. This is so that when monsoon rains come, there is space to store the excess rain water and also so that water can be released in a regulated manner. But the authorities store the maximum amount of water in reservoirs even before the close of the monsoon, only to ensure greater electricity generation and irrigation:

74. With reference to the above passage, the following assumptions have been made:
  1. High risks involved in holding maximum water in reservoirs are due to our over-dependence on hydropower projects.
  2. Storage capacity of dams should not be fully used before or during monsoon season.
  3. Role of dams in flood control is underestimated in India.
  Which of the above assumptions is/are valid?
  (a) 1 and 2 only   (b) 2 only
  (c) 3 only   (d) 1, 2 and 3

Passage–5

Economic liberalization in India was shaped largely by the economic problems of the government than by the economic priorities of the people or by the long-term development objectives. Thus, there were limitations in conception and design which have been subsequently validated by experience. Jobless growth, persistent poverty and rising inequality have mounted as problems since economic liberalization began. And all these years later, four quiet crises confront the economy; agriculture, infrastructure, industrialization and education as constraints on the country's future prospects. These problems must be resolved if economic growth has to be sustained and transformed into meaningful development.

75. Which of the following is/are the **most rational and logical inference/inferences** that can be made from the passage?
  1. It is essential to rethink and redefine the economic role of the State in the quest for development.
  2. India has not made effective implementation of its policies in social sectors nor made sufficient investments in them.

Select the correct answer using the code given below.
  (a) 1 only   (b) 2 only
  (c) Both 1 and 2   (d) Neither 1 nor 2

76. With reference to the above passage, the following assumptions have been made:
  1. India's economy needs to be greatly integrated with global economy so as to create large number of jobs and to sustain its growth momentum.
  2. Economic liberalization would cause large economic growth which would reduce poverty and create sufficient employment in the long run.
  Which of the above assumptions is/are valid?
  (a) 1 only   (b) 2 only
  (c) Both 1 and 2   (d) Neither 1 nor 2

77. A shop owner offers the following discount options on an article to a customer:
  1. Successive discounts of 10% and 20%, and then pay a service tax of 10%.
  2. Successive discounts of 20% and 10%, and then pay a service tax of 10%.
  3. Pay a service tax of 10% first, then successive discounts of 20% and 10%.
  Which one of the following is correct?
  (a) 1 only is the best option for the customer.
  (b) 2 only is the best option for the customer.
  (c) 3 only is the best option for the customer.
  (d) All the options are equally good for the customer.

78. The letters from A to Z are numbered from 1 to 26 respectively. If GHI = 1578 and DEF = 912, then what is ABC equal to:
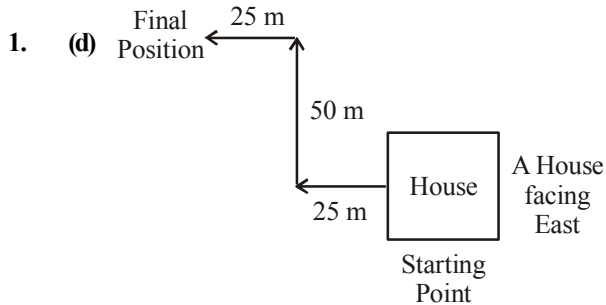 (a) 492   (b) 468
  (c) 262   (d) 246

79. What is the missing term @ in the following?
  ACPQ : BESU :: MNGI : @
  (a) NPJL   (b) NOJM
  (c) NPIL   (d) NPJM

80. What is the largest number among the following?

(a) $\left(\dfrac{1}{2}\right)^{-6}$ (b) $\left(\dfrac{1}{4}\right)^{-3}$

(c) $\left(\dfrac{1}{3}\right)^{-4}$ (d) $\left(\dfrac{1}{6}\right)^{-2}$

ANSWERS AND EXPLANATIONS

1. (d)

Man's final position is in North-West with respect to his starting point.

When his house faces east, then man started towards the direction west from back of his house, after 25 m he turn to his right towards North direction, then after covering 50 m in the North-direction, he turns to his left and stopped at 25 m. Finally, he is towards North-West with respect to his starting point.

2. (a)

I. Number divisible by 2 are 2, 4, 6, 8, 10, ...

II. Number divisible by 3 are 3, 6, 9, 12, ...

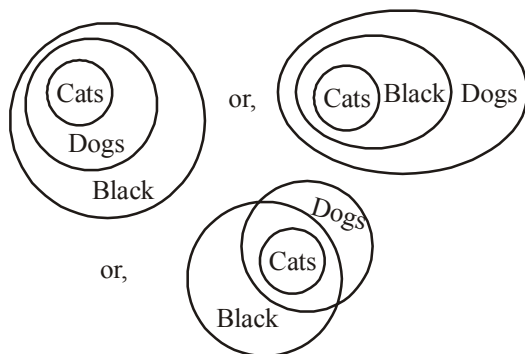Thus, Number divisible by 2 and 3 are 6, 12, 18, 24, ...

Conclusion-I : Number, divisible by 6 are, 6, 12, 18, 24, ...

Hence conclusion I is true.

Conclusion-II : Numbers divisible by 4 are, 4, 8, 12, 16, ... Here 6, 18, 30, ... are not divisibile by 4 but divisible by 2 and 3.

Hence, conclusion II is not correct.

3. (c)

Here, there are three conclusions we can draw from the given statements, thus neither conclusion-I nor conclusion II are true.

4. (b) In the given series, there are 6 odd numbers that are followed by odd number.

5. (b) G's position from left end

= A's position from the left end + 11

= $16 + 11 = 27^{th}$ from left end.

G's position from right end

= A's position from right end – 3

= $18 – 3 = 15$th from right end.

Total number of boys in the row

= $(27 + 15) – 1 = 41$.

6. (d) From $S_1 : D > C > A, B$

We get that D is oldest one among the given four persons.

From $S_3 : A > B$, B is younger than A.

From S_1 and S_3, we get that,

$$\underset{(\text{oldest})}{D} > C > A > \underset{(\text{youngest})}{B}$$

B is the youngest.

7. (c) Between 1 to 100, there are 12 integer numbers that have 4 as a digit but are not divisible by 4. Those numbers are, 14, 34, 41, 42, 43, 45, 46, 47, 49, 54, 74 and 94.

8. (a) Let side of $P = K$, thens side of $Q = 2K$.

Volume of $P = X = (K)^3$,

Volume of $Q = Y = (2K)^3 = 8K^3$

Mass of $P = m$ and Mass of $Q = n$

From question, $n = 2m$.

Now, $u = \dfrac{m}{x} = \dfrac{m}{K^3}$

and, $v = \dfrac{n}{y} = \dfrac{2m}{8K^3} = \dfrac{1}{4}\left(\dfrac{m}{K^3}\right) = \dfrac{1}{4}(u)$

$\therefore u = 4v$.

9. (c) Let age of the teacher is x years.

Then, age of each student

= $(x – 20)$ years

Average age

$$= \dfrac{\text{Sum of ages of 3 Students and Teacher}}{\text{Number of Persons}}$$

$\Rightarrow 20 = \dfrac{3(x – 20) + x}{4}$

$\Rightarrow 80 = 3x – 60 + x \Rightarrow 4x = 140 \Rightarrow x = 35.$

Hence, Teacher's age = 35 years.

10. (d) Cost price of the Car

$$= \text{Selling Price} \times \frac{100}{(100 - \text{Loss \%})}$$

$$= 300000 \times \frac{100}{(100 - 20)} = ₹3,75,000.$$

11. (d) According to the passage, policies must be undertaken to strengthen domestic private investment.

12. (a) The given passage stresses on the need of undertaking of inter-linking of rivers. It can also be assumed from the passage that for proper distribution of water, there should be a network of dams and canals across the country.

13. (a) The passage clearly indicates that the lower tax rates in a country always interpret the greater investments in higher education.

14. (b) From the given passage, it can be assumed that urban local bodies are not efficient enough to meet the water requirements of our cities.

15. (b) The assumption that only rich cities can ensure sustainable delivery of water is not adequate. However, sustainable delivery of water in cities does not mean just supplying water to households.

16. (b) A good price incentive can trigger investments in agriculture can easily be assumed from the passage. Further, higher global prices of agriculture commodities are also important for India's poverty reduction.

17. (d) Inclusive agriculture growth is key to reduce poverty in the near future.

18. (c) From $S_1 : R > P$ and Q
From $S_2 : R > S$, as S is not the largest one
From S_1 and S_2, $R > P$, Q and S
Hence, R is the largest.
Thus, both statements S_1 and S_2 together are sufficient to answer the question.

19. (d) From S_1 : Prime numbers between 10 and 20 are 11, 13, 17 and 19.
From S_2 : Number between 10 and 20, that leaves a remainder 1, when divided by 4 are 13 and 17.
Thus from both S_1 and S_2 together, we cannot find a number n.

20. (c) From S_1 : Product of the numbers is 21, that numbers are (1, 21) and (3, 7).
From S_2 : Their sum = 10 i.e. 3 + 7 = 10.
Hence, from S_1 and S_2 together, we get two numbers 3 and 7, such that $3 \times 7 = 21$ and $3 + 7 = 10$.

21. (b) For $(\times) = 3$

$\underline{3} + 1\underline{3} + 5\underline{3} + \underline{3}3 + \underline{3}1 = 1\underline{33}$

In such type of question, we check the solutions by going through the given options.

22. (b) Let AB and CD are two straight sticks of length 7.5 feet and 3.25 feet respectively. If we cut the AB into 4 equal parts.

We get a length $= \dfrac{AB}{4} = \dfrac{7.5}{4} = 1.875$ feet

Again, if we cut the CD into 2 equal parts.

We get a length $= \dfrac{CD}{2} = \dfrac{3.25}{2} = 1.625$ feet

Now, $\left(\dfrac{AB}{4} - \dfrac{CD}{2}\right) = 1.875 - 1.625 = 0.25$ feet

Hence, we can measure a minimum length of 0.25 feet by using two given sticks.

23. (c) The continuous prime numbers starting from 13 are,

13, 17, 19, 23, 29, 31, 37, ...
(each $+1$)
Given series : 14, 18, 20, 24, 30, 32, 38

Hence, next term of the series is 38.

24. (b) Let, there are n number of pages in the book.

Sum of page numbers $= \dfrac{n(n+1)}{2}$

$\therefore n(n+1) = 2 \times (\text{Sum of page numbers})$
Here given, sum of page numbers = 195.
$\therefore n(n+1) = 195 \times 2 + Z$
where, $Z = 2 \times$ (Sum of two continuous page number that is torn out)
For, $n = 20$,
$20 \times 21 = 390 + Z$
$\Rightarrow Z = 420 - 390 = 30$

$\Rightarrow \dfrac{Z}{2} = 15$

Here, $\dfrac{Z}{2} = 7 + 8$

Hence, torn page number is 7, 8.

25. (c) The missing letter's that complete the series are :
$a\ b\ a\ b\ \underline{a}\ b\ c\ \underline{c}\ b\ c\ b\ \underline{c}\ d\ c\ d\ c\ d\ e\ d\ e\ \underline{e}\ d$
The pattern is $ababa,\ bcbcb,\ cdcdc,\ deded$
Hence, letters a, c, c, e complete the sequence.

26. (c) Sum of numbers are :

$$
\begin{array}{cccc}
A & 3 & B & C \\
D & E & 2 & F \\
\hline
1\ 5 & 9 & 0 & 2 \\
\hline
\end{array}
$$

Here, $C + F = 12$ (since 2 is at unit place of the sum)

As all letters represents different value,

so, $(C, F) \neq (2, 3)$.

Now, possible values of $(C, F) = (4, 8), (5, 7)$ ...(i)

Again, $B + 2 = 10 - 1 \Rightarrow B = 9 - 2 = 7$ ...(ii)

and, $3 + E = 9 - 1 \Rightarrow E = 8 - 3 = 5$ ...(iii)

$A + D = 15 \Rightarrow 9 + 6 = 15$ ...(iv)

From (i), (ii) and (iii), $(C, F) = (4, 8)$

From (i), (ii), (iii) and (iv)

$$\begin{array}{cccc} 9 & 3 & 7 & 4 \\ 6 & 5 & 2 & 8 \\ \hline 1 \ 5 & 9 & 0 & 2 \\ \hline \end{array}$$

Thus, $A - D = 9 - 6 = 3$.

27. (c) From S_1 and S_2, we get

$1 \leq$ Number of figures on each page ≤ 2

$\therefore 51 \leq$ Number of figures on 51 pages ≤ 102

Hence, we can not get exact number of figures on 51 pages by the given two statements.

28. (a) Let number of girls and boys are m and n respectively.

Then, total marks in English $= (8.8) \times (m + n)$

$\therefore 9m + 8n = (8.8)(m + n)$

$\Rightarrow 0.2m = 0.8n \Rightarrow m = 4n.$

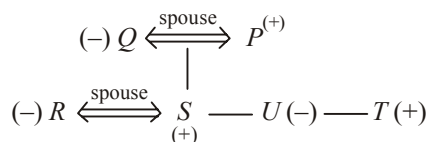Again, total marks in Hindi $= x(m + n)$

$\Rightarrow 8m + 7n = x(m + n)$

$\Rightarrow 8(4n) + 7n = x(4n + n)$

$\Rightarrow 39n = 5n \cdot x \Rightarrow x = \dfrac{39}{5} = 7.8.$

29. (b)

$$(-) Q \xleftrightarrow{\text{spouse}} P^{(+)}$$

$$(-) R \xleftrightarrow{\text{spouse}} S \underset{(+)}{\quad} \text{——} \ U(-) \text{——} T(+)$$

[Here, (+) - Male, (−) - Female]

In the family of 6 members, three are males and three are females. Now, when R is U's husband, then number of male members becomes 4 i.e. T, S, R and P.

So, R must is a female and daughter-in-law of Q. Q is the wife of P. T is an unmarried brother of P. U is unmarried sister of S.

30. (c) Number of days between 12th January to 12th July in a leap year

$= 19 + 29 + 31 + 30 + 31 + 30 + 12 = 182 = 26$ weeks

Hence, 12th July will be same as 12th January in a leap year. So, it will be Sunday.

31. (d) Increased social sector spending is imperative for large-scale job creation.

32. (a) From the given passage, it can easily be assumed that state should have some institutions to ensure its appropriate role in a digital society. Further, state should also ensure that private parties do not violate the citizens' right to privacy.

33. (b) The passage clearly indicates that engineering water systems should be modernised and further augmented.

34. (a) In the given passage, the author stresses that the distribution of your wealth across different kinds of assets would be correct initiative as by doing so your risks would minimised.

35. (b) From the given passage, it can be inferred that biotechnology regulation is an evolving process. Further, biotechnology regulation should take into account socio-economic aspects in decision-making.

36. (c) The most important point that can be reflected from the passage is biotechnology's role cannot be confined to the current priorities of developing GM crops.

37. (a) Given product

$1 \times 5 \times 10 \times 15 \times 20 \times 25 \times 30 \times 35 \times 40 \times 45 \times 50 \times 55 \times 60$

$= 1 \times 5 \times 10 \times (15 \times 2) \times 10 \times 25 \times 30 \times (35 \times 2) \times 10 \times (2 \times 45) \times 50 \times (55 \times 2) \times 30$

$= 1 \times 5 \times \underline{10} \times \underline{30} \times \underline{10} \times 25 \times \underline{30} \times \underline{70} \times \underline{10} \times \underline{90} \times \underline{50} \times \underline{110} \times \underline{30}$

Total number of zeroes $= 10$.

38. (b) Here $(x + y + z)$ is not divisible by 3.

So, number formed by the digits x, y and z will not be divisible by 3.

Number, xyz, yzx and zxy will not be divisible by 3.

Now, $xyz + yzx + zxy = 3(x + y + z)$ will be divisible by 3 but not by 9.

39. (c) $p - 2016 = r - 2018$

$\Rightarrow r - p = 2018 - 2016 = 2$

$\therefore r > p.$

Again, $p - 2016 = s + 2019$

$p - s = 2019 + 2016 \Rightarrow p - s = 4035$

$\therefore p > s.$

Also, $r - 2018 = q + 2017$

$\Rightarrow r - q = 2017 + 2018 \Rightarrow r - q = 4035$

$\therefore r > q.$

Hence, r is the largest natural number.

40. (a) Sum of digits $= 1 + 2 + 3 + 4 + 5 = 15$.

and 15 is divisible by 3. Thus all 5 digits numbers obtained by the digits 1, 2, 3, 4 and 5 will be divisible by 3.

All 5 digits numbers obtained by using all the digits 1, 2, 3, 4 and 5 without repetition of digits, will be divisible by 3.

Hence, no 5 digits prime number can be obtained by the digits 1, 2, 3, 4 and 5.

41. **(a)** X can complete 20% of work in 8 days.

So, X can complete 100% of work in $8 \times 5 = 40$ days.

Again, Y can complete 25% of work in 6 days.

So, Y can complete 100% of work in $6 \times 4 = 24$ days

Time required to complete whole work by working

together $= \dfrac{40 \times 24}{40 + 24} = \dfrac{40 \times 24}{64} = 15$ days.

Now, time required to complete 40% of the work

$= \dfrac{40}{100} \times 15 = 6$ days.

42. **(b)** Let the distance between X and Y is d Km.

Average Speed $= \dfrac{\text{Total distance covered}}{\text{Total time taken}}$

$= \dfrac{(d + d + d + d)}{\left(\dfrac{d}{v} + \dfrac{d}{2v} + \dfrac{d}{3v} + \dfrac{d}{4v}\right)}$

$= \dfrac{4d \times 12v}{(12 + 6 + 4 + 3)d} = \dfrac{4 \times 12v}{25}$

$= 1.92v$ Km/hr.

Hence, average speed lies between v and $2v$ Km/hr.

43. **(b)**

(1) Minimum number of point of intersection of a square and a circle = 0.

 ← Minimum (0)   ← Maximum (8)
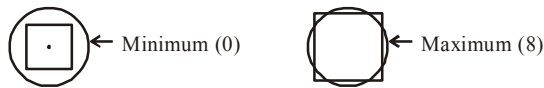
(2) The maximum number of point of intersection of a square and circle = 8.

Hence, (1) is not correct but (2) is correct.

44. **(d)** Let speed in still water is u km/hr. and speed of current is v km/hr.

Downstream speed $= (u + v)$ km/hr.

Upstream speed $= (u - v)$ km/hr.

Time to row upstream $(t_1) = \dfrac{d}{(u - v)}$

where d = distance to row

Time to row downstream $(t_2) = \dfrac{d}{(u + v)}$

ATQ,

$\dfrac{t_1}{t_2} = \dfrac{2}{1} = \dfrac{\dfrac{d}{(u - v)}}{\dfrac{d}{(u + v)}}$

$\Rightarrow \dfrac{u + v}{u - v} = \dfrac{2}{1}$

$\Rightarrow \dfrac{\dfrac{u}{v} + 1}{\dfrac{u}{v} - 1} = 2 \Rightarrow \left(\dfrac{u}{v}\right) = 3$

$\therefore u : v = 3 : 1.$

45. **(a)** Let two natural numbers are m and n, such that $m > n$.

Then, $m^2 - n^2 = 63$

$\Rightarrow (m - n)(m + n) = 63$

Now, $63 = (1, 63), (3, 21), (7, 9)$

(I) $m - n = 1$ (II) $m - n = 3$

$m + n = 63$ $m + n = 21$

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$m = 32$, and $n = 31$ $m = 12, n = 9$

For $m - n = 7$

    $m + n = 9$

    $m = 8$ and $n = 1$

$\therefore (m, n) = (8, 1), (12, 9)$ and $(32, 31)$

46. **(d)** $\dfrac{2}{3} = \dfrac{2 + 5}{3 + 5} = \dfrac{7}{8} \Rightarrow \dfrac{2}{3} < \dfrac{7}{8}$,

Difference $= 0.875 - 0.667 = 0.208$

$\dfrac{3}{4} = \dfrac{3 + 5}{4 + 5} = \dfrac{8}{9} \Rightarrow \dfrac{3}{4} < \dfrac{8}{9}$,

Difference $= 0.889 - 0.75 = 0.139$

$\dfrac{4}{5} = \dfrac{4 + 5}{5 + 5} = \dfrac{9}{10} \Rightarrow \dfrac{4}{5} < \dfrac{9}{10}$,

Difference $= 0.9 - 0.8 = 0.1$

$\dfrac{5}{6} = \dfrac{5 + 5}{6 + 5} = \dfrac{10}{11} \Rightarrow \dfrac{5}{6} < \dfrac{10}{11}$,

Difference $= 0.909 - 0.833 = 0.076$.

Hence, minimum change is observed in $\dfrac{5}{6}$.

47. **(d)** n is a digit, which is divisible by 3 but not by 2.

$\therefore n = 9$

Now, $2 \times 9 = 18$; 18 is not divisible by 4.

$3 \times 9 = 27$; 27 is not divisible by 4.

$2 \times 9 + 4 = 22$; 22 is not divisible by 4.

$3 \times 9 + 1 = 28$; 28 is divisible by 4.

48. (c) 1 Kg = 1000 gm = 1 litre

$\therefore$ 0.1 gm = 1×10^{-4} litre = 1×10^{-1} cubic meter

$= 1 \times 10^{-1} \times 1000$ cubic millimeter

$= 100$ cubic millimeter.

49. (a) Let vessel weight is B Kg and volume of vessel is V.

Full vessel of water weighs = 40 Kg.

$\dfrac{1}{3}$ filled vessel of water weighs = 20 Kg.

ATQ, $B + V = 40$ ...(i)

$B + \dfrac{V}{3} = 20$ ...(ii)

From equation (i) and (ii), we get

$\left(V - \dfrac{V}{3}\right) = 40 - 20 \Rightarrow \dfrac{2V}{3} = 20 \Rightarrow V = 30$

and $B = 40 - V = 40 - 30 = 10$ Kg.

50. (b) Depth of the walls = 4.5 m = 450 cm.

Frog jump = 30 cm.

Frog slip = 15 cm.

Resultant height jump in one hop on = $30 - 15 = 15$ cm.

Height jump in 28 hop on = $28 \times 15 = 420$ cm.

On 29th hop on, frog will jump,

$420 + 30 = 450$ cm or 4.5 m.

51. (c) From the given passage, it can be inferred that the economic reforms that started in 1991 have not helped in improving the economy to expected levels.

52. (c) The most logical and rational inference that can be made from the given passage is to get renewable resources to market too soon may be costly.

53. (b) The assumption that India's commitment of reducing emissions by 33% by 2030 shall be on the basis of gas-based economy is correct and has been stated in the given passage.

54. (c) From the given passage, it can be assumed that genome editing does not require the transfer of genes from one plant to another. It further says that through genome editing, the chosen genes can be altered precisely in a manner akin to the natural process that helps plants to adapt to the environmental factors.

55. (c) The statement that solid waste management should be integrated with the maintenance of drainage and sewerage networks best reflects the critical message of the passage.

56. (b) The most logical inference from the passage is religious freedom under the Constitution is open to state intervention.

57. (d) First letter of each word is D and last letter of each work is I.

So, number of ways of arrange first and last letter of the word = 1

Remaining letter = 3.

Remaining 3 letters arrange at 3 positions in

$^3P_3 = 3! = 3 \times 2 \times 1 = 6$ ways.

Hence, total number of required word = $6 \times 1 = 6$.

And that words are DELHI, DLHEI, DHELI, DEHLI, DLEHI, DHLEI.

58. (c)

	Liquid A	Liquid B
Initial	20	0
After first itteration	$20 - 4 = 16$	4

Ratio of Liquid A : Liquid B = 16 : 4 = 4 : 1.

When 4 litres of mixture taken out after first itteration.

Liquid A in 4 litre mix $= 4 \times \dfrac{4}{5} = \dfrac{16}{5}$.

Liquid B in 4 litre mix $= 4 \times \dfrac{1}{5} = \dfrac{4}{5}$.

Then, after second itteration,

Liquid A	Liquid B
$16 - \dfrac{16}{5} = \dfrac{64}{5}$	$4 - \dfrac{4}{5} + 4 = \dfrac{36}{5}$

Ratio $= \dfrac{64}{5} : \dfrac{36}{5} = 16 : 9$.

59. (c) Total runs scored by the batsman in 50 innings

$= 50 \times 46.4 = 2320$.

Total runs scored by the batsman in 60 innings

$= 60 \times (46.4 + 2.6) = 2940$.

Total runs scored in last 10 innings

$= 2940 - 2320 = 620$.

Average score in last 10 innings $= \dfrac{620}{10} = 62$.

60. (b) Let original price of the rice is ₹ x/Kg.

Amount of rice purchased in ₹ 1200 $= \dfrac{1200}{x}$ Kg.

When price increases by 25%, then price of rice is ₹ 1.25x/Kg.

and amount of rice purchased in ₹1200 $= \dfrac{1200}{1.25x}$

ATQ,

$\dfrac{1200}{x} - \dfrac{1200}{1.25x} = 6$

$\dfrac{1200(1.25-1)}{1.25x} = 6 \Rightarrow x = \dfrac{1200 \times 0.25}{1.25 \times 6} = 40.$

Hence, original price of rice is ₹ 40/Kg.

61. **(d)** $3\dfrac{1}{2}$ m $= \dfrac{7}{2}$ m

$8\dfrac{3}{4}$ m $= \dfrac{35}{4}$ m

For greatest length, we do H.C.F. of $\dfrac{7}{2}$ and $\dfrac{35}{4}$

$= \dfrac{\text{H.C.F. of 7 and 35}}{\text{L.C.M. of 2 and 4}} = \dfrac{7}{4} = \boxed{1\dfrac{3}{4}}$

62. **(d)** Natural growth rate for the period :

Year	Birth rate	Death rate	Growth rate
1911-1921	48.1	35.5	48.1 – 35.5 = 12.6
1941-1951	39.9	27.4	39.9 – 27.4 = 12.5
1961-1971	41.1	18.9	41.1 – 18.9 = 22.2
1971-1981	37.1	14.8	37.1 – 14.8 = 22.3

Hence, natural growth rate is maximum in 1971-1981.

63. **(b)** $1.272727..... = \dfrac{127-1}{99} = \dfrac{126}{99} = \dfrac{14}{11}.$

64. **(b)** L.C.M. of 3, 4, 5 and 6 = 60.
Least 4 digits number divided by 3, 4, 5 and 6 is
$60 \times 17 = 1020.$
Remainder in each case = 2.
So, required number $= 1020 + 2 = 1022.$

65. **(c)** Let man adult population of the city is 300.
Then, married male adult population

$= 300 \times \dfrac{40}{100} = 120.$

As, there are no widows and widowers and no man marries more than one woman and vice-versa.
So, number of married woman in the city = Number of married man in the city = 120.

ATQ,
Percent of married woman = 30%.

$\therefore$ Total woman population $= \dfrac{120 \times 100}{30} = 400.$

Total population of the city $= 300 + 400 = 700.$
Total married population $= 120 + 120 = 240.$
Percent of married adult population

$= \dfrac{240}{700} \times 100 = 34\dfrac{2}{7}\%$

66. **(a)** $51 \times 27 \times 35 \times 62 \times 75 \div 100$
$= 51 \times 27 \times 35 \times 31 \times 150 \div 100$
$= K \times 150 \div 100$
where $K = 51 \times 27 \times 35 \times 31$
Now, when we divided 150 by 100,
remainder $= 150 - 100 = 50.$

67. **(c)** Ratio of shares of $x : y : z = \dfrac{1}{2} : \dfrac{3}{4} : \dfrac{5}{6} = 6 : 9 : 10.$

Shares of $x = 2500 \times \dfrac{6}{(6+9+10)} = 600.$

Shares of $y = 2500 \times \dfrac{9}{(6+9+10)} = 900.$

Shares of $z = 2500 \times \dfrac{10}{(6+9+10)} = 1000.$

Difference between maximum and minimum shares
$= 1000 - 600 = ₹ 400.$

68. **(b)**

Value of n	Number	Sum of digits
$n = 0$	$(10)^0 + 1 = 1 + 1 = 2$	2
$n = 1$	$(10)^1 + 1 = 11$	$1 + 1 = 2$
$n = 2$	$(10)^2 + 1 = 100 + 1 = 101$	$1 + 0 + 1 = 2$
$n = 3$	$(10)^3 + 1 = 1000 + 1 = 1001$	$1 + 0 + 0 + 1 = 2$

Hence, for n = whole number, sum of digits of number $((10)^n + 1)$ is always 2.

69. **(c)** Average weight of the students

$= \dfrac{\text{Sum of weight of the students}}{\text{Number of students}}$

Dividing the students into several groups does not change total weight of the students and also number of students in the class remains unchanged. So, average weight of the class remains the same.

70. **(a)** Different sums that can obtained by taking atleast 3 out of 5 denominations are -

$^5C_3 + {}^5C_4 + {}^5C_5 = 10 + 5 + 1 = 16.$

71. **(d)** Relying on a homogeneous food source is not desirable best reflects the critical message of the passage.

72. **(d)** The most rational and practical implication of the given passage is that mothers should be encouraged to breastfeed their children immediately after birth. Secondly, the authorities should ensure the vaccination as prescribed.

73. **(d)** The most rational inference that can be made from the passage is that the farmers' income will be higher with pulse cultivation than with paddy cultivation. Secondly, in the context of northern Indian agriculture, paddy straw has no usefulness.

74. **(b)** The valid assumption with reference to the passage can be the storage capacity of dams should not be fully used before or during monsoon season.

75. **(d)** The inference drawn from the passage that it is essential to rethink and redefine the economic role of the State in the quest for development is not admissible. Similarly, India has not made effective implementation of its policies in social sectors nor made sufficient investment in them also not well-founded.

76. **(d)** The inference that India's economy needs to be greatly integrated with global economy so as to sustain its growth momentum cannot be made from the given passage. Similarly, the assumption 2 is also not tenable.

77. **(d)** Let the original price of the article = ₹100.

1. $100 \times \left(\dfrac{100-10}{100} \right) \times \left(\dfrac{100-20}{100} \right) \times \left(\dfrac{100+10}{100} \right)$

$= 100 \times \dfrac{90}{100} \times \dfrac{80}{100} \times \dfrac{110}{100} = 79.2.$

2. $100 \times \left(\dfrac{100-20}{100} \right) \times \left(\dfrac{100-10}{100} \right) \times \left(\dfrac{100+10}{100} \right)$

$= 100 \times \dfrac{80}{100} \times \dfrac{90}{100} \times \dfrac{110}{100} = 79.2.$

3. $100 \times \left(\dfrac{100+10}{100} \right) \times \left(\dfrac{100-20}{100} \right) \times \left(\dfrac{100-10}{100} \right)$

$= 100 \times \dfrac{110}{100} \times \dfrac{80}{100} \times \dfrac{90}{100} = 79.2.$

Thus, all the options are equally good for the customer.

78. **(d)**

	G	H	I
Letter position :	7	8	9
Code :	7 × 2 = (14)	8 × 2 = (16)	9 × 2 = (18)

$\Rightarrow 14(16)(18) = (14)(16+1)8 = (14+1)78 = 1578.$

	D	E	F
Letter position :	4	5	6
Code :	4 × 2 = (8)	5 × 2 = (10)	6 × 2 = (12)

$\Rightarrow 8(10)(12) = 8(10+1)(2) = (8+1)(1)(2) = 912.$

	A	B	C
Letter position :	1	2	3
Code :	1 × 2 = (2)	2 × 2 = (4)	3 × 2 = (6)

$\Rightarrow 246.$

79. **(d)**

A   C   P   Q   :   B   E   S   U
+1 +2 +3 +4

Similarly,

M   N   G   I   :   N   P   J   M
+1 +2 +3 +4
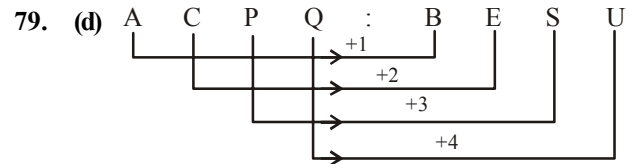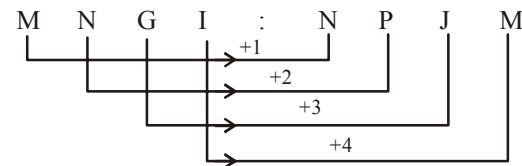
80. **(c)**

(a) $\left(\dfrac{1}{2} \right)^{-6} = (2)^6 = 64.$

(b) $\left(\dfrac{1}{4} \right)^{-3} = (4)^3 = 64.$

(c) $\left(\dfrac{1}{3} \right)^{-4} = (3)^4 = 81.$ (Maximum)

(d) $\left(\dfrac{1}{6} \right)^{-2} = (6)^2 = 36.$

Hence, $\left(\dfrac{1}{3} \right)^{-4}$ is maximum.