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Cracking the CSAT

Civil Services Aptitude Test

PAPER 2

Complete Coverage of

Comprehension, Basic Numeracy, Data Interpretation and Sufficiency, Decision Making and Problem Solving, Interpersonal Skills including, Communication Skills, Logical Reasoning and Analytical Ability, English Language, Comprehension Skills

Solved Papers 2021-2011 &
5 Crack Sets

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PREFACE

From 2016, the merit of the Preliminary Examination is determined purely on the basis of marks obtained in General Studies Paper 1. Whereas General Studies Paper 2 (CSAT) is made qualifying which means one must score minimum marks in this paper too i.e. 33% to qualify for mains.

We are back with a diversified and a whole new revised edition of 'Cracking the CSAT Paper 2.' With our aim to make all the dreams come true of the aspiring candidates, we present the new improved and exquisite book with all the latest features and the formats of UPSC Civil Service Preliminary.

For 2022 CSAT Paper 2, we have strategised a foolproof plan and execution for the aspirants to easily grasp the concept from the revised 2021 edition.

Main Features of the Book

- According to the questions asked in the year 2021, technical terms like Inference (a conclusion reached on the basis of evidence), Assumption (an idea that is formed without evidence), Corollary (Logical), etc., are included in this edition.
- As per 2021 examination, General Mental Ability, Analytical Reasoning, Decision Making, Problem Solving and Interpersonal Skills including Communication Skills have been revised intelligently.
- Basic Numeracy, Comprehension, Data Interpretation and Sufficiency and English Language Comprehension have also been included with improved features and formats.
- At the end of the book, according to the last years' papers, detailed explanations with 5 Crack Sets have been given which will definitely help the aspirants to crack CSAT Paper 2, 2022.

We welcome valuable suggestions and directions from our readers.

Authors

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Interpersonal Skills Including Communication Skills

Logical Reasoning & Analytical Ability

English Language Comprehension*

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* *Questions from English Language Comprehension are not asked in UPSC CSAT Paper II, but in State PCS questions are asked from it. That's why this section is included in this book.*

UPSC-CSAT

Civil Services Aptitude Test

Know about Examination!

CIVIL SERVICES IN INDIA

The Union Public Service Commission (UPSC) is conducting Civil Services Exam for Group A and Group B for recruitment in the services like-

Indian Administrative Services, Indian Foreign Services, Indian Police Services, Indian Revenue Services, Combined Defence Services Examination (CDSE). Engineering Services Examination, Indian Economic Service/Indian Statistical Services Examination, etc.

There are three stages of the examination: **Preliminary Examination, Main Examination and Interview**

- Those who qualify the Preliminary Examination are selected for Main Examination and those who qualify the Main Examination are then, called for the Interview. The final merit list, made according to the combined marks obtained in the Main Examination and the Interview, is the list of successful candidates.
- There will be negative marking for all questions.

Objectives of Civil Services Aptitude Test

For the development of the country, Civil Servant plays a vital role.

As an officer on duty, a candidate will find himself/herself in situations in which he/she would have to take urgent decisions, and for this, the individual must possess good decision-making and problem solving skills with analytical and mental abilities. As a Civil Servant, a person comes across various data types and structures, and would have to base the decision on interpretations of the given data structures.

It is thus clear that through aptitude test, the innate or acquired capability of the candidate could be tested.

Career in Civil Services

Civil Servants are appointed by the President on recommendations of the UPSC and so their services could also be terminated by the President only. The Civil Servants are paid well with various perks.

There is ample scope for promotion in the service. The aura attached by the country to Civil Servants, the stability in job and an opportunity to be the part of the 'development' of the country are the hosts of attractions which motivate a large number of highly qualified youth of the country to choose the Civil Services as a career.

Syllabus of Preliminary Examination

The Examination shall comprise of two compulsory papers of 200 marks each.

The General Studies Paper-II of Civil Services (Preliminary) Examination will be a qualifying paper with minimum qualifying marks fixed at 33%.

Paper I

T. Q. 100 T. M. 200 T. T. 2 Hours

- Current events of national and international importance
- History of India and Indian National Movement
- Indian and World Geography – Physical, Social, Economic Geography of India and World
- Indian Polity and Governance – Constitution, Political System, Panchayati Raj Public Policy, Rights Issues, etc
- Economic and Social Development – Sustainable Development, Poverty, Inclusion, Demographies, Social Sector Initiatives, etc.
- General Issues on Environmental Ecology, Biodiversity and Climate Change
- General Science

Paper II

T. Q. 80 T. M. 200 T. T. 2 Hours

- Comprehension
- Interpersonal Skills Including Communication Skills
- Logical Reasoning and Analytical Ability
- Decision Making and Problem Solving
- General Mental Ability
- Basic Numeracy (numbers and their relations, orders of magnitude, etc.,- Class X level), Data Interpretation (charts, graphs, tables, data sufficiency, etc.,- Class X level)

Section-Wise
STRATEGY
CSAT 2022

Comprehension

This section has almost 30-35% weightage in the CSAT Paper 2. The good thing about this section is that, it is the most scoring part in CSAT Paper 2 and the most interesting thing is that, you don't need to be equipped with any prior knowledge. For this, you should know how to differentiate between assumptions and conclusions, verbal expressions of the author and your arguments.

By practicing CSAT Paper II, you can understand basic things about the topic.
As per questions asked in the year 2021, aspirants should have a brief knowledge about technical terms, like Inference, Corollary and Assumption, etc.

You should read the question first and determine what to look Corollary for within the answer choices. In general, you have to look for the answer choices that either strengthen or weaken the argument and predict the answer after reading and understanding the passage, the premises and the argument. You should take care of the words like may, only, if only, can, must, should, etc. Remember, your answers should be totally based on the passage and your understanding of the passage only. Scoring good marks in this section depends entirely on how much you can synchronise yourself with the author. Aspirants should select passages from different areas like Science, Philosophy, Economics, Art, Environment, Literature, etc., for practice.

Basic Numeracy

This section covers topics related to number and their relations, orders of magnitude, etc. The questions range from purely numeric calculations to problems of arithmetical reasoning, group and table reading, percentage analysis and quantitative analysis.

In this, we require more Reasoning Ability to solve mathematical problems than in pure Mathematics itself. On the whole, students are tested for their sharpness to analyse the given data in a short span of time.

Basic Numeracy can be divided into five categories

1. Numerical Aptitude

Understanding of numbers, their relations and applications may help a candidate in calculating various data or analysing charts and dealing with calculations. This includes basic knowledge of various types of numbers and topics related to them such as Rational and Irrational Numbers, Prime Numbers and their Properties, Surds and Indices, Logarithms, Simplification questions based on BODMAS and Basic Formulae, HCF and LCM, Divisibility Tests, etc. The questions related to BODMAS, Surds and Indices, Logarithms, Divisibility Rules and HCF and LCM are important from the examination point of view.

2. Arithmetic

In this module, topics covered include Percentage and its Properties, Simple and Compound Interest, Ratio and Proportion and its Properties (Partnership and Mixtures), Time, Speed and Distance (including the concept of trains, boats, streams and clocks) and Time and Work, which also covers questions on pipes and cisterns. Questions in this module are more scoring than those in other modules, as they are easy to interpret and also there are very few concepts that one has to master to do well in these topics. The questions involve use of concepts and tricks of the Number System. Some short and easily memorised tricks may prove helpful in such problems. Sometimes, approximate calculations may be useful in eliminating the wrong choices in the answer options.

3. Algebra

This module contains Basics of Polynomials, Linear Equations in One, Two or Three Variables, Quadratic Equations and Progressions (AP, GP & HP), Basics of Maxima and Minima. Algebra has not been asked in the previous years, but still students are advised to go through the basic concepts of algebra.

4. Geometry and Mensuration

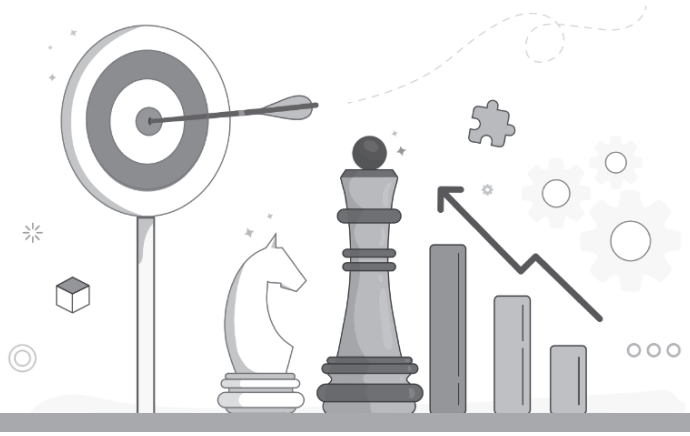
In geometry, we have topics like Lines, Angles, Triangles, Quadrilaterals, Circles and their Properties, Area and Perimeter of various figures like triangle, quadrilateral, circle, etc., and Volume of Figures like cylinder, cone, sphere, hemisphere, etc. Geometry questions have been asked in some previous years' papers, so students should go through the basic theorems and the formulae to find the area and the volume of different figures. Simple geometry of lines and angles, plane figures like circles, triangles, squares, rectangles and parallelograms and three-dimensional figures like cubes, cuboids, cylinders, cones, spheres and hemispheres, etc., may be asked in the CSAT examination. You should remember the basic formulae related with volumes, perimeters and areas of these figures. Questions on Sectors and Segments are also important. Questions where one has to find the area of the shaded part are most important in this module.

5. Modern Mathematics

This includes topics like Permutations and Combinations, Probability and the basic logical aspects of Set Theory (Union and Intersection). Permutations and Combinations is a very important topic from this module, as in the past, one or two questions of moderate to high difficulty level were asked from this topic. A lot of practice is required to do well in this Basic Numeracy section.

The students are advised to attempt the question at least twice before looking at the solution. This will help in the development of their aptitude in solving a new question. Also, one should learn the techniques to solve the questions from the given options or try to solve the questions by eliminating the options.

DATA INTERPRETATION AND SUFFICIENCY



Data can be represented in different forms such as Tables, Graphs, Charts, etc.

This part has questions based on data represented in the form of Tables, Bar Graphs, Line Graphs, Pie Charts, Mixed Graphs, etc., and students are required to analyse the data and solve the questions in context to the data given. We basically have three types of questions in Data Interpretation, i.e. calculation, counting and reasoning based questions. In calculation based questions, we have to do mathematical calculations to find the answer; in counting based questions, we have to do counting while following certain constraints; in reasoning based questions, more than one constraints are given to solve the question asked. Questions related to Data Interpretation require your ability to comprehend and analyse the given data and solve related questions quickly and accurately.

Bar Chart

It is a graph having rectangular bars in which length is proportional to the value that it represent. The bars can be plotted vertically or horizontally. Bar graphs are the best for comparing larger changes or differences in data among groups. Bar graphs are very useful because they allow the reader to recognise patterns for trends for more easily than looking at a table of numerical data.

Histogram

It is a graphical representation, showing a visual impression of the distribution of data. It shows frequency of a continuous data. A histogram consists of tabular frequencies, shown as adjacent rectangles, erected over discrete intervals with an area equal to the frequency of the observations in the interval. The height of the rectangle is equal to the frequency density of the interval, that is, the frequency divided by the width of the interval.

Line Chart

It is a type of graph, which displays information as a series of data points connected by straight line segments. It is created by connecting with line segments a series of scattered points that represent individual measurements. Tables are the

systematic and scientific presentation of quantitative data to understand the given information. They enable the viewer to make comparison of facts and draw quick conclusions.

Pie Chart

It is a circular chart divided into sectors in which the arc length, its central angle and area are proportional to the quantities that it represents.
It conveys approximate proportional relationships at a point in time. It is difficult to compare different sections of a given pie chart or to compare data across different pie charts. Pie charts are generally used to show percentage or proportional data and usually the percentage represented by each category is provided next to the corresponding slice of pie.

Data Sufficiency

In this part a question is followed by statement(s) and you will be expected to find whether the information provided in the statements individually or collectively is sufficient to answer the question. Good mathematical knowledge and skills are required to solve data sufficiency problems because these problems appear more difficult at first. But once you become familiar with the directions, you find these problems no harder than standard aptitude problems.

General Mental Ability (GMA)

General mental ability is one of the prime topics of most of the entrance examinations. This section analyses a student's ability to picturise data and rearrange it to reach to a solution. From a student's perspective, GMA as a subject does not require any formal learning of specific rules, but an exposure to and find your own way to handle tricky questions.

These questions can be based on Puzzles, Dice, Visual Reasoning, Alpha-Numeric Reasoning, Number Series, Logical/Alphabetical/Diagrammatic Sequences, Codes, Blood Relations, Directions, Venn Diagrams, etc. It may encompasses our verbal concepts, vocabulary, arithmetic and spatial awareness.

Logical Reasoning and Analytical Ability

The previous year's examination emphasised more on the Analytical Ability questions as opposed to Logical Reasoning questions. The Analytical Ability questions were asked from familiar areas and in familiar form.

This section tests the ability to reason out correctly. This section is closest to real life problems. Here, questions can be based on Short Passages, Syllogisms, Statement and Conclusion, Evaluating Inferences, etc.

Assumptions are unstated facts and logical connections in a statement. In order for the conclusion of a statement to be true, the assumptions on which that statement is based must also be true. In the questions based on arguments, a statement is followed by two arguments. A strong argument is that which touches the practical and real aspect of the situation as described in the statement. A weak argument is a very simple, superfluous and long drawn one. Candidates are required to distinguish between the strong and weak argument. A strong argument should not be mere reiteration of the situation given in the statement.

As a responsible Civil Servant officer, you will have to face many administrative challenges where the ability to decide the correct course of action will prove very important. Course of action should be feasible and should relate to the practical aspects of life. For solving such questions, think of yourself as the officer-in-charge concerned, who has to take the decision impartially. Mostly questions will be based on an Indian context, so consider the socio-economic conditions of India while choosing the correct course of action. e.g. if any direction is given by the courts, then the possible courses of action at the various steps taken by the government is to execute that direction.

DECISION MAKING AND PROBLEM SOLVING

This section measures a candidate's ability to take a decision based on a given set of conditions and information. Decision Making is the ability of an individual to prioritise the various alternatives available to him/her. Based on your experiences gathered so far, you can make decisions.

All decisions are based on the situation in which it has been taken. Decision Making is in the domain of Interpersonal Skills and it is based on perception, use of intellect, emotion and volition. Interpersonal skills are effective and coordinated ways of delivering the decisions.

Remember, while resolving a situation, the candidate just has to present his/her own attitude and approach for solving the same. Think yourself as a responsible Civil Servant while attempting these questions. An officer has to be a good communicator and a good facilitator, the Decision Making section of CSAT is therefore, a very important topic.

INTERPERSONAL SKILLS INCLUDING COMMUNICATION SKILLS

The true meaning of skill is 'possession of quality to do something' or 'avail something done'. Soft skills also known as non-technical skills, are the personal values and interpersonal skills that determine a person's ability to work well with others in a project team. These skills include effective communication, leadership and team work skills, showing problem solving abilities; initiative and motivation skill, showing honesty and strong work ethics. Communication is also a kind of interpersonal skill. UPSC has included it in its examination pattern to select appropriate candidates amongst aspirants. We should consider these skills especially for prelims as well as for interview.

Uptil now, no question has been asked in examination from this section.

TREND ANALYSIS OF CSAT
PAPER 2

Based on Trend Analysis of 2013, 2014, 2015, 2016, 2017, 2018, 2020 and 2021 papers, the number of questions have been asked from each section, are

Test Area	2021	2020	2019	2018	2017	2016	2015	2014	2013
Comprehension	26	25	20	26	30	27	30	26	23
Basic Numeracy, Data Interpretation and Sufficiency	26	43	25	32	24	26	24	19	20
General Mental Ability	23	11	24	16	20	22	20	24	22
Logical Reasoning and Analytical Ability	3	1	11	6	6	5	6	5	1
English Language Comprehension	-	-	-	-	-	-	-	6	8
Decision Making and Problem Solving	2	-	-	-	-	-	-	-	6
Interpersonal Skills including Communication Skills	-	-	-	-	-	-	-	-	-
Total	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**

In Year 2021 Questions were asked from 26 passages, 26 questions from Basic Numeracy, Data Interpretation and Data Sufficiency. 23 questions were asked from General Mental Ability. 3 questions were asked from Logical Reasoning and Analytical Ability. 2 questions were asked from Decision Making and Problem Solving.

In Year 2020 25 questions were asked from 15 passages, 20 questions from Basic Numeracy and 23 questions were asked from Data Interpretation and Data Sufficiency. 11 questions were asked from General Mental Ability. 1 question was asked from Logical Reasoning and Analytical Ability.

In Year 2019 20 questions were asked from 11 passages, 13 questions from Basic Numeracy and 12 questions were asked from Data Interpretation and Data Sufficiency. 24 questions were asked from General Mental Ability. 11 questions were asked from Logical Reasoning and Analytical Ability.

In Year 2018 26 questions were asked from 19 passages, 18 questions from Basic Numeracy and 14 questions were asked from Data Interpretation and Data Sufficiency. 16 questions were asked from General Mental ability. 6 questions were asked from Logical Reasoning and Analytical Ability.

In Year 2017 30 questions were asked from 29 passages, 24 questions from Basic Numeracy. There were no questions asked from Data Interpretation and Data Sufficiency. General Mental Ability section had 20 questions which analysed students' ability to comprehend data. 6 questions were there from logical reasoning and analytical ability based on statements and conclusions and syllogism. No questions were asked from non-verbal reasoning, decision-making, English language comprehension and communication skills in the paper.

In Year 2016 27 questions were asked from 17 passages, 26 questions from Basic Numeracy. There were no questions from Data Interpretation this year. Logical Reasoning and Analytical Ability included 5 questions and 22 questions were there from General Mental Ability. In this year, no questions were asked from Decision Making, English Language Comprehension, Problem Solving and Non-verbal Reasoning.

In Year 2015 30 questions were asked from 23 passages, 24 questions from Basic Numeracy, 6 questions from Logical Reasoning and Analytical Ability, 20 questions from General Mental Ability. In year 2015 no questions were asked from Decision Making and Problem Solving and English Language Comprehension.

In Year 2014 26 questions were asked from 8 passages, 19 questions were asked from Basic Numeracy and Data Interpretation, 5 questions from Logical Reasoning and Analytical Ability, 24 questions from General Mental Ability.

In Year 2013 23 questions were asked from 8 passages, 20 questions were asked from Basic Numeracy, 6 questions from Decision Making and Problem Solving, 1 question from Logical Reasoning and Analytical Ability, 22 questions from General Mental Ability and 8 questions from English Language Comprehension.

SOLVED PAPER 2021

CSAT

Civil Services Aptitude Test

PAPER 2

Time : 2 hrs

MM : 200

INSTRUCTIONS

- There are 80 questions in this paper.
- The answer of any question you are thinking that more than two answers are true. then you must choose the nearest one. There is only one answer to be selected by you.

Penalty for wrong answer

- There are four alternative answers in every question. When you select a wrong answer, then 1/3rd marks of that question is deducted in you total marks.
- If any candidate gives more than one answer and one of them is true but it is treated as a wrong answer and the candidate is penalised for that and 1/3rd marks will be deducted.

Directions *for the following 4 (four) items : Read the following four passages and answer the items that follows. Your answers to these items should be based on the passages only*

Passage 1

With respect to what are called denominations of religion, if everyone is left to be a judge of his own religion, there is no such thing as religion that is wrong; but if they are to be a judge of each other's religion, there is no such thing as a religion that is right, and therefore all the world is right or all the world is wrong in the matter of religion.

1. What is the most logical assumption that can be made from the passage given above?

(a) No man can live without adhering to some religious denomination.

(b) It is the duty of everyone to propagate one's religious denomination

(c) Religious denominations tend to ignore the unity of man

(d) Men do not understand their own religious denomination.

↘ (c) The passage states that, with the perspective of the looker, the meaning of religion changes. When we consider our own religion to be the correct one and all others as false or untrue, we are presuming that all men are not united by any shared common values.

Passage 2

It is certain, that seditions, wars, and contempt or breach of the laws are not so much to be imputed to the wickedness of the subjects, as to the bad state of a dominion. For men are not born fit for citizenship, but must be made so. Besides, men's natural passions are everywhere the same; and if wickedness more prevails, and more offences are committed in one commonwealth than in another, it is certain that the former has neither enough pursued the end of unity, nor framed its laws with sufficient forethought; and that, therefore, it has failed in making quite good its right as a commonwealth.

2. Which among the following is the most logical and rational inference that can be made from the passage given above?

(a) Seditions, wars and breach of the laws are inevitable in every dominion.
(b) It is not the people, but the sovereign who is responsible for all the problems of any dominion.
(c) That dominion is the best which pursues the aim of unity and has laws for good citizenship.
(d) It is impossible for men to establish a good dominion.

(c) In the given options, option (c) is the most logical and rational inference, because if there are high number of crimes in dominion/place with comparison to another, it is due to laws without foresight and the theory sovereign has not pursued well for unity.

Passage 3

Inequality violates a basic democratic norm: the equal standing of citizens. Equality is a relation that obtains between persons in respect of some fundamental characteristic that they share in common. Equality is, morally speaking, a default principle. Therefore, persons should not be discriminated on grounds such as race, caste, gender, ethnicity, disability, or class. These features of human condition are morally irrelevant. The idea that one should treat persons with respect not only because some of these persons possess some special features or talent, for example skilled cricketers, gifted musicians, or literary gaints, but because persons are human beings, is by now part of commonsense morality.

3. With reference to the above passage, the following assumptions have been made:

1. Equality is a prerequisite for people to participate in the multiple transactions of society from a position of confidence.
2. Occurrence of inequality is detrimental to the survival of democracy.
3. Equal standing of all citizens is an idea that cannot actually be realised even in a democracy.
4. Right to equality should be incorporated into our values and day-to-day political vocabulary.

Which of the above assumptions are valid?

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

(a) The passage states that Equality is most important in democracy which encourages people to participate in society with confidence. When inequality persist the violation of democratic norms bound to take place. So we can assume that occurrence of inequality is detrimental to the survival of democracy.

Passage 4

Aristocratic government ruins itself by limiting too narrowly the circle within which power is confined; oligarchic government ruins itself by the incautions scramble for immediate wealth. But even democracy ruins itself by excess of democracy. Its basic principle is the equal right of all to hold office and determine public policy. This is, at first glance, a delightful arrangement; it becomes disastrous because the people are not properly equipped by education to select the best rulers and the wisest courses. The people have no understanding and only repeat what their rulers are pleased to tell them. Such a democracy is tyranny or autocracy.–Plato

4. Which one of the following statements best reflects the crux of the passage given above?

(a) Human societies experiment with different forms of governments.
(b) Any form of government tends to deteriorate by excess of its basic principle.
(c) Education of all citizens ensures a perfect, functional and sustainable democracy.
(d) Having a government is a necessary evil because tyranny is inherent in any form of government.

(c) The passage talks about two forms of government i.e oligarchy and democracy, and it states that both forms can turn into tyrannies by excess of its basic principle. Therefore, education of all citizen ensures a perfect, functional and non-authoritarian democracy.

5. In a group of 120 persons, 80 are Indians and rest are foreigners. Further, 70 persons in the group can speak English. The number of Indians who can speak English is

(a) 20 (b) 30
(c) 30 or less (d) 30 or more

(d) Total number of persons = 120
Number of Indians = 80
and number of foreigners = 120 – 80 = 40
∵ Number of persons who can speak English = 70
∵ There are 40 foreigners in maximum, who can speak English.
∴ Maximum possible number of Indians who can speak English $\geq 80 + 70 - 120 \geq 150 - 120 \geq 30$.

6. Consider all 3-digit numbers (without repetition of digits) obtained using three non-zero digits which are multiples of 3. Let S be their sum. Which of the following is/are correct?

1. S is always divisible by 74.
2. S is always divisible by 9.

Select the correct answer using the codes given below:

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

(c) Three non-zero digits which are multiples of 3 are : 3, 6 and 9

Using these 3 digits, we can make 3! *i.e.,* 6 three-digit numbers.

So, their sum (s) = 369 + 396 + 639 + 693 + 936 + 963
= 3996

∴ 3996 is divisible by both 74 and 9.

7. There are two classes A and B having 25 and 30 students respectively. In class A the highest score is 21 and lowest score is 17. In class B the highest score is 30 and lowest score is 22. Four students are shifted from class A to class B.

Consider the following statements :

1. The average score of class B will definitely decrease.
2. The average score of class A will definitely increase.

Which of the above statements is/are correct?

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

(a) We know that,

$$\text{Average score} = \frac{\text{Sum of all scores}}{\text{Number of students}}$$

1. Since, 4 students are moved from A to B, therefore average of class B will definitely decrease as range of marks for class A is less than range of marks for class B.

   ∴ Statement 1 is correct.

2. According to the question, we are not sure regarding the marks of the 4 students that have been moved from class A.

∴ We can not determine whether the average score of class A will increase or decrease.

∴ Statement 2 is incorrect.

8. Consider two statements and a question:

Statement 1 Priya is 4 ranks below Seema and is 31st from the bottom.

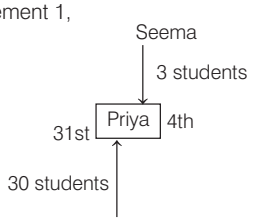
Statement 2 Ena is 2 ranks above Seema and is 37th from the bottom.

Question What is Seema's rank from the top in the class of 40 students?

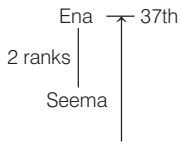
Which one of the following is correct in respect of the Statements and the Question?

(a) Statement 1 alone is not sufficient to answer the question.
(b) Statement 2 alone is not sufficient to answer the question.
(c) Either statement 1 alone or statement 2 alone is sufficient to answer the question.
(d) Both statement 1 and statement 2 are required to answer the question.

(c) From statement 1,



From statement 2,



It is given, total number of students = 40

∴ Seema's rank from top can be calculated using either of the statements.

9. Consider two statements and a question:

Statement 1 Each of A and D is heavier than each of B, E and F, but none of them is the heaviest.

Statement 2 A is heavier than D, but is lighter than C.

Question Who is the heaviest among A, B, C, D and E?

Which one of the following is correct in respect of the statements and the question?

(a) Statement 1 alone is sufficient to answer 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.

(a) From statement 1,

A and D > B, E and F

and none of them is the heaviest, so we can conclude that C must be the heaviest.

From statement 2,

C > A > D

Using this statement alone, we can not find the heaviest item.

∴ Statement 1 alone is sufficient to answer the question.

10. In the English alphabet, the first 4 letters are written in opposite order and the next 4 letters are written in opposite order and so on and at the end Y and Z are interchanged. Which will be the fourth letter to the right of the 13th letter?

(a) N (b) T
(c) H (d) I

(b) The English alphabet is :
ABCD EFGH IJKL MNOP QRST UVWX YZ
As per the question, letters are arranged as follows
DCBA HGFE LKJI PONM TSRQ XWVU ZY
∴ 4th letter to the right of the 13th letter = 13 + 4
= 17th letter
∴ The required letter is T.

Directions *for the following 4 (four) items: Read the following four passages and answer the items that follows. Your answers to these items should be based on the passages only*

Passage 1

India faces a challenging immediate future in energy and climate policy-making. The problems are multiple: sputtering fossil fuel production capabilities; limited access to electricity and modern cooking fuel for the poorest; rising fuel imports in an unstable global energy context; continued electricity pricing and governance challenges leading to its costly deficits or surplus supply; and not least, growing environmental contestation around land, water and air. But all is not bleak: growing energy efficiency programmes; integrated urbanisation and transport policy discussions; inroads to enhancing energy access and security; and bold renewable energy initiatives, even if not fully conceptualised, suggest the promise of transformation.

11. Which one of the following statements best reflects the critical message conveyed by the passage given above?

(a) India's energy decision-making process is ever more complex and interconnected.
(b) India's energy and climate policy is heavily tuned to sustainable development goals.
(c) India's energy and climate actions are not compatible with its broader social economic and environmental goals.
(d) India's energy decision–making process is straightforward supply–oriented and ignores the demand side.

(a) The passage highlights about India's challenges in energy sector and climate policy. The problems are multiple such as flawed fossil fuel production capabilities, unstable global market, and other illustrates how energy decision-making process is complex and interconnected.

Passage 2

There are reports that some of the antibiotics sold in the market are fed to poultry and other livestock as growth promoters. Overusing these substances can create superbugs, pathogens that are resistant to multiple drugs and could be passed along humans. Mindful of that, some farming companies have stopped using the drugs to make chickens gain weight faster. Since Denmark banned antibiotic growth promoters in the 1990s, the major pork exporter says it is producing more pigs and the animals get fewer diseases.

12. Which one of the following statements best reflects the critical message conveyed by the passage given above?

(a) People should avoid consuming the products of animal farming.
(b) Foods of animal origin should be replaced with foods of plant origin.
(c) Using antibiotics on animals should be banned.
(d) Antibiotics should only be used to treat diseases.

(d) The message conveyed by the passage that Antibiotics should only be used to treat diseases and not to be used for poultry and other livestock. Even Denmark banned antibiotic growth stimulus, despite being largest pork exporter.

Passage 3

Policy makers and media have placed the blame for skyrocketing food prices on a variety of factors including high fuel prices, bad weather in key food producing countries, and the diversion of land to non-food production. Increased emphasis, however, has been placed on a surge in demand for food from the most populous emerging economies. It seems highly probable that mass consumption in these countries could be well poised create a food crisis.

13. With reference to the above passage, the following assumptions have been made:

1. Oil producing countries are one of the reasons for high food prices.
2. If there is a food crisis in the world in the near future, it will be in the emerging economies.

Which of the above assumptions is / are valid?

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

(d) Statement 1 is incorrect, because the passage states that the increasing food prices are the result of high fuel prices. However it nowhere mentioned oil-producing nations being one of the reasons.
Statement 2 is also incorrect, as the passage is not specifically single out the emerging economies are causative agent of food crisis in future. It only states that the emerging economies will be highly affected.

Passage 4

A central message of modern development economies is the importance of income growth, by which is meant growth in Gross Domestic Product (GDP). In theory, rising GDP creates employment and investment opportunities. As incomes grow in a country where the level of GDP was once low, households, communities, and governments are increasingly able to set aside some funds for the production of things that make for a good life. Today GDP has assumed such a significant place in the development lexicon, that if someone mentions "economic growth", we know they mean growth in GDP.

14. With reference to the above passage, the following assumptions have been made:

1. Rising GDP is essential for a country to be a developed country.
2. Rising GDP guarantees a reasonable distribution of income to all households.

Which of the above assumptions is/are valid?

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

(d) Statement 1 is incorrect as with the reference of the passage, only rising GDP cannot be the essential criteria for a developed country, but income redistribution also important.

Statement 2 is also incorrect, as throughout the passage, rising GDP is not sure short guarantees reasonable distribution to all households.

15. Seven books P, Q , R, S, T, U and V are placed side by side. R, Q and T have blue covers and other books have red covers. Only S and U are new books and the rest are old. P, R and S are law reports; the rest are Gazetteers. Books of old Gazetteers with blue covers are

(a) Q and R (b) Q and U
(c) Q and T (d) T and U

(c) According to the question, following table represents the information :

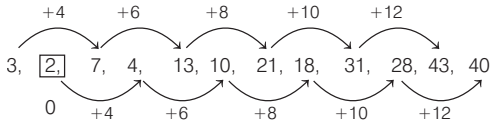
P	Q	R	S	T	U	V
Red	Blue	Blue	Red	Blue	Red	Red
Old	Old	Old	New	Old	New	Old
Law-reports	Gazetteers	Law-reports	Law-reports	Gazetteers	Gazetteers	Gazetteers

∴ Only books Q and T are old Gazetteers with blue covers.

16. Replace the incorrect term by the correct term in the given sequence
3, 2, 7, 4, 13, 10, 21, 18, 31, 28, 43, 40 where odd terms and even terms follow the same pattern.

(a) 0 (b) 1 (c) 3 (d) 6

(a) Given series,



Since, odd terms and even terms follow the same pattern as per the given in question.

∴ '2' will be replaced with '0'.

17. Following is a matrix of certain entries. The entries follow a certain trend row-wise. Choose the missing entry (?) accordingly.

7B	10A	3C
3C	9B	6A
10A	13C	?

(a) 9B (b) 3A
(c) 3B (d) 3C

(c) Given pattern is as follows
⇒ 10 – 7 = 3 and BAC
⇒ 9 – 3 = 6 and CBA
⇒ 13 – 10 = 3 and ACB
∴ ? = 3B

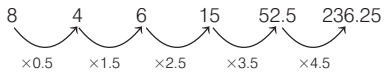
18. You are given two identical sequences in two rows

Sequence-I	8	4	6	15	52.5	236.25
Sequence-II	5	A	B	C	D	E

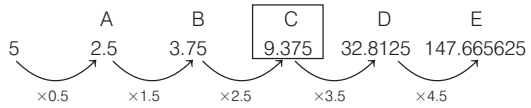
What is the entry in the place of C for the sequence-II?

(a) 2.5 (b) 5
(c) 9.375 (d) 32.8125

(c) According to the sequence I,



∴ The sequence II,



∴ C = 9.375

19. A person *X* from a place *A* and another person *Y* from a place *B* set out at the same time to walk towards each other. The places are separated by a distance of 15 km. *X* walks with a uniform speed of 1.5 km/h and *Y* walks with a uniform speed of 1 km/h in the first hour, with a uniform speed of 1.25 km/h in the second hour and with a uniform speed of 1.5 km/h in the third hour and so on.

Which of the following is/are correct?

1. They take 5 h to meet.

2. They meet midway between *A* and *B*.

Select the correct answer using the codes given below:

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

(c) Distance between *A* and *B* = 15 km

Speed of X = 1.5 km/h

∴ Distance covered by *X* in 5 h = 5 × 1.5 = 7.5 km

Speed of *Y* in 1st hour = 1 km/h

So, distance covered by *Y* in 1st hour = 1 km.

According to the question,

Total distance covered by *Y* in 5 h

= 1 + 1.25 + 1.5 + 1.75 + 2 = 7.5 km

∴ Both the statements are correct/true.

20. A student appeared in 6 papers. The maximum marks are the same for each paper. His marks in these papers are in the proportion of 5 : 6 : 7 : 8 : 9 : 10. Overall he scored 60%. In how many number of papers did he score less than 60% of the maximum marks?

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

(b) Let the total marks in each subject be 100.

∴ Total marks for 6 subjects = 6 × 100 = 600

∴ Overall marks scored = 60% of 600

$$= \frac{60}{100} \times 600 = 360$$

According to the question,

$$5x + 6x + 7x + 8x + 9x + 10x = 360$$

$$\Rightarrow \quad 45x = 360$$

$$\Rightarrow \quad x = \frac{360}{45} = 8$$

∴ Marks in the given subjects are 5 × 8, 6 × 8, 7 × 8, 8 × 8, 9 × 8 and 10 × 8 or 40, 48, 56, 64, 72 and 80.

∴ In 3 papers only, he score less than 60% of the maximum marks.

Directions *Read the following four passages and answer the items that follows. Your answers to these items should be based on the passages only*

Passage 1

Fig trees (Genus ficus) are considered sacred in India, East Asia and Africa and are common in agricultural and urban landscapes where other large trees are absent. In natural forests, fig trees provide food for wildlife when other resources are scarce and support a high density and diversity of frugivores (fruit-eating animals). If frugivorous birds and bats continue to visit fig trees located in sites with high human disturbance, sacred fig trees may promote frugivores abundance. Under favourable microclimate, plenty of seedlings of other tree species would grow around fig trees.

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

1. Fig trees can often be keystone species in natural forests.
2. Fig trees can grow where other large woody species cannot grow.
3. Sacred trees can have a role in biodiversity conservation.
4. Fig trees have a role in the seed dispersal of other tree species.

Which of the above assumptions is/are valid?

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

(d) Through the passage, we can assume that fig trees not only provides food for wildlife, but also supports frugivores due to scarcity of resources. It can grow in harsh climate zone/area where other plants and trees can't survive. By fig trees seed dispersal of other tree species also takes place.

Passage 2

At the heart of agroecology is the idea that agroecosystems should mimic the biodiversity levels and functioning of natural ecosystems. Such agricultural mimics, like their natural models, can be productive, pest-resistant nutrient conserving, and resilient to shocks and stresses. In ecosystems there is no 'waste', nutrients are recycled indefinitely. Agroecology aims at closing nutrient loops, i.e., returning all nutrients that come out of the soil back to the soil such as through application of farmyard manure. It also harnesses natural processes to control pests and build soil fertility i.e.' through intercropping. Agroecological practices include integrating trees with livestock and crops.

22. Consider the following

1. Cover crops 2. Fertigation
3. Hydroponics 4. Mixed farming
5. Polyculture 6. Vertical farming

Which of the above farming practices can be compatible with agroecology, as implied by the passage?

(a) 1, 4 and 5 only (b) 2, 3, 4 and 5 only
(c) 1, 2, 3 and 6 only (d) 4 and 6 only

(a) According to the passage practices of cover cropping, mixed farming and polyculture can be compatible with agroecology, which include intergrating trees with livestock and crops.

Cover cropping soil is covered with plants to prevent soil erosion

Mixed farming growing two or more species simultaneously in same field.

Polyculture many crops are grown simultaneously as a crop rotation.

Passage 3

Computers increasingly deal not just with abstract data like credit card details and databases, but also with the real world of physical objects and vulnerable human bodies. A modern car is a computer on wheels; an aeroplane is a computer on wings. The arrival of the "Internet of Things" will see computers baked into everything from road signs and MRI scanners to prosthetics and insulin pumps. There is little evidence that these gadgets will be any more trustworthy than their desktop counterparts. Hackers have already proved that they can take remote control of internet connected cars and pacemakers.

23. Which one of the following statements best reflects the most critical inference that can be made from the passage given above?

(a) Computers are not completely safe.
(b) Companies producing the software do not take cyber security seriously.
(c) Stringent data security laws are needed.
(d) The present trend of communication technologies will affect our lives in future.

(d) The most critical inference of the passage is that, the new trends in various technological advancements have pushed in visible complexities in various fields with the arrival of the Internet of Things, our lives will definitely be affected.

Passage 4

A social and physical environment riddled with poverty, inequities, unhygienic and insanitary conditions generates the risk of infectious diseases. Hygiene has different levels: personal, domestic and community hygiene. There is no doubt that personal cleanliness brings down the rate of infectious diseases. But the entry of the market into this domain has created a false sense of security that gets conditioned and reinforced by the onslaught of advertisements. Experience in Western Europe shows that along with personal hygiene, general improvements in environmental conditions and components like clean water, sanitation and food security have brought down infant/child death/infection rates considerably. The obsession with hand hygiene also brings in the persisting influence of the market on personal health, overriding or marginalising the negative impact on ecology and the emergence of resistant germs.

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

1. People who are obsessed with personal hygiene tend to ignore the community hygiene.
2. Emergence of multi-drug resistant germs can be prevented by personal cleanliness.
3. Entry of the market in the domain of hygiene increases the risk of infectious diseases.
4. Scientific and micro-level interventions are not sufficient to bring down the burden of infectious diseases.
5. It is community hygiene implemented through public health measures that is really effective in the battle against infectious diseases.

Which of the above assumptions are valid.

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

(c) Experience in Western Europe have proved that community hygience through public measures are highly effective in reducing infectious diseases. Scientific and micro-level interventions are not sufficient to bring down the burden of infectious diseases. Community hygiene as a public health measure can really be effective against infectious diseases.

25. A statement followed by conclusion-I and conclusion-II is given below. You have to take the Statement to be true even if it seems to be at variance from the commonly known facts. Read all conclusions and then decide which of the given conclusion(s) logically follows/follow from the statement, disregarding the commonly known facts.

Statement Some cats are almirahs. Some almirahs are chairs. All chairs are tables.

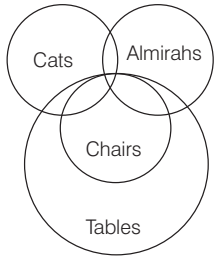
Conclusion I : Certainly some almirahs are tables.

Conclusion II : Some cats may not be chairs.

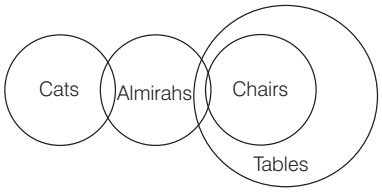
Which one of the following is correct?

(a) Only conclusion I
(b) Only conclusion II
(c) Both conclusion I and conclusion II
(d) Neither conclusion I nor conclusion II

(c) From statement,



Or



∴ Conclusion I : ✓

and conclusion II : ✓

∴ Both conclusions follow from the statement.

26. A boy plays with a ball and he drops it from a height of 1.5 m. Every time the ball hits the ground, it bounces back to attain a height 4/5th of the previous height. The ball does not bounce further if the previous height is less than 50 cm. What is the number of times the ball hits the ground before the ball stops bouncing?

(a) 4 (b) 5
(c) 6 (d) 7

(c) Given, height = 1.5 m = 150 cm

Height of ball when it hits the ground 1st time

$= \frac{4}{5} \times 150 = 120$ m

Height of ball when it hits the ground 2nd time

$= \frac{4}{5} \times 120 = 96$ m

Height of ball when it hits the ground 3rd time

$= \frac{4}{5} \times 96 = 76.8$ m

Height of ball when it hits the ground 4th time

$= \frac{4}{5} \times 76.8 = 61.44$ m

Height of ball when it hits the ground 5th time

$= \frac{4}{5} \times 61.44 = 49.152$ m

Since, it is given that if the previous height is less than 50 cm, the ball does not bounce further. So, we can say that after the ball hits the ground for the 6th time, it doesn't bounce back.

27. Images of consonants of the English alphabet (Capitals) are observed in a mirror. What is the number of images of these which do not look like their original shapes?

(a) 13 (b) 14
(c) 15 (d) 16

(b) All the consonants of the English alphabet are :

B, C, D, F, G, H, J, K, L, M, N, P, Q, R, S, T, V, W, X, Y, Z

So, there are total 21 consonants.

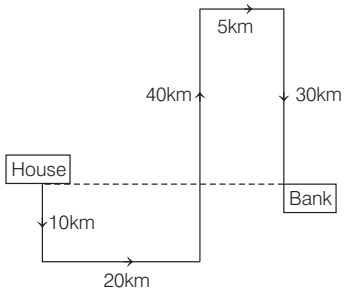
The number of consonants whose images look like them are: H, M, T, V, W, X and Y (Total 7)

∴ The number of consonants whose images do not look like them = 21 – 7 = 14

28. A bank employee drives 10 km towards South from her house and turns to her left and drives another 20 km. She again turns left and drives 40 km, then she turns to her right and drives for another 5 km. She again turns to her right and drives another 30 km to reach her bank where she works. What is the shortest distance between her bank and her house?

(a) 20 km
(b) 25 km
(c) 30 km
(d) 35 km

(b) According to the question,



∴ Shortest distance between her bank and her house

= 20 + 5 = 25 km

29. Integers are listed from 700 to 1000. In how many integers is the sum of the digits 10?

(a) 6 (b) 7 (c) 8 (d) 9

(d) According to the question,

Required integers

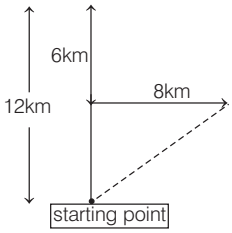
= 703, 712, 721, 730, 802, 811, 820, 901 and 910.

∴ Required number of integers = 9

30. A woman runs 12 km towards her North, then 6 km towards her South and then 8 km towards her East. In which direction is she from her starting point?

(a) An angle less than 45° South of East
(b) An angle less than 45° North of East
(c) An angle more than 45° South of East
(d) An angle more than 45° North of East

(b) The path taken by the woman has been depicted below :



∴ She must be "at an angle less than 45° North of East". from her starting point.

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

Passage 1

Researchers simulated street lighting on artifical grassland plots containing pea-aphids, sap-sucking insects, at night. These were exposed to two different types of light - a white light similar to newer commercial LED lights and an amber light similar to sodium street lamps. The low intensity amber light was shown to inhibit, rather than induce, flowering in a wild plant of the pea family which is a source of food for the pea-aphids in grasslands. The number of aphids was also significantly suppressed under the light treatment due to the limited amount of food available.

31. Which one of the following statements best reflects the most critical inference that can be made from the passage given above?

(a) Low intensity light has more adverse effect on the plant as compared to high intensity light.
(b) Light pollution can have a permanent adverse impact on an ecosystem.
(c) White light is better for the flowering of plants as compared to the light of other colours.
(d) Proper intensity of light in an ecosystem is important not only for plants but also for animals too.

(d) The best inference that can be made from the passage that proper intensity of light in an ecosystem is important for plants and animals. Through the research, it is found that low intensity light significantly suppressed growth of aphids.

Passage 2

Approximately 80 percent of all flowering plant species are pollinated by animals, including birds and mammals, but the main pollinators are insects. Pollination is responsible for providing us with a wide variety of food, as well as many plant-derived medicines. At least one-third of the world's agricultural crops depend upon pollination. Bees are the most dominant taxa when it comes to pollination and they are crucial to more than four hundred crops. Pollination is an essential service that is the result of intricate relationships between plants and animals, and the reduction or loss of either affects the survival of both. Effective pollination requires resources, such as refuges of pristine natural vegetation.

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

1. Sustainable production of India's cereal food grains is impossible without the diversity of pollinating animals.
2. Monoculture of horticultural crops hampers the survival of insects.
3. Pollinators become scarce in cultivated areas devoid of natural vegetation.
4. Diversity in insects induces diversity of plants.

Which of the above assumptions is / are valid?

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

(d) The passage states that, pollination is responsible for providing us a wide variety of food, as well as herbal medicines. However scarcity of pollinators is a major issue of concern. The passage stresses for an intricate relationship between plants and animals pollination is an essential service. Diversity in insects improves the yields and quality of crops as well as enhances diversity in plants.

Passage 3

A study conducted on the impacts of climate change over the Cauvery basin of Tamil Nadu using regional climate models showed an increasing trend for maximum and minimum temperatures, and a decrease in the number of rainy days. These climatic shifts will have an impact on the hydrological cycles in the region, lead to more run-off and less recharge, and affect the groundwater tables. Further, there has been an increase in the frequency of droughts in the State. This had driven farmers to increase dependency on groundwater resources to secure their crops.

33. Which one of the following statements best reflects the crux of the passage given above?

(a) Development of regional climate models helps in choosing climate-smart agricultural practices.
(b) Heavy dependence on groundwater resources can be reduced by adopting dry-land cropping systems.
(c) Climate changes increase the criticality of water resources while simultaneously threatening it.
(d) Climate changes cause the farmers to adopt unsustainable livelihoods and risky coping strategies.

(c) Option (c) is the main crux of the passage. Climate change has adverse impact on the hydrological cycles over the Cauvery basin of Tamil Nadu. The climatic shifts have lead to more run-off and less recharge, and also affects the groundwater tables.

Passage 4

Researchers were able to use stem cells to gauge the neurotoxic effects of the environmental pollutant Bisphenol A (BPA). They used a combination of biochemical and cell-based assays to examine the gene expression profile during the differentiation of mouse embryonic stem cells upon treatment with BPA, a compound known to cause heart diseases, diabetes, and developmental abnormalities in humans. They were able to detect and measure BPA toxicity towards the proper specification of primary germ layers, such as endoderm and ectoderm and the establishment of neural progenitor cells.

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

1. BPA may alter embryonic development in vivo.
2. Biochemical and cell-based assays are useful in finding out treatments for pollution-induced diseases.
3. Embryonic stem cells could serve as a model to evaluate the physiological effect of environmental pollutants.

Which of the above assumptions are valid?

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

(c) Statement 1 is correct as Bisphenol A (BPA) may reduce embryonic development in vivo and also causes heart diseases, diabetes, and developmental abnormalities in humans.

Statement 3 is correct as well because Embryonic stem cells could serve as a model to evaluate the physiological effects of environmental pollutants.

35. If 3^{2019} is divided by 10, then what is the remainder?

(a) 1 (b) 3 (c) 7 (d) 9

(c) We know that, unit place of the power of 3 repeats after every 4 steps (i.e., it has a cyclicity of 4).

Now, on dividing 2019 by 4, we get a remainder of 3.

Hence, 3^{2019} will have the same last digit as that of 3^3.

$\therefore \quad (3^3)/10 = \frac{27}{10}$

$\therefore$ The remainder will be 7.

36. The number 3798125*P*369 is divisible by 7. What is the value of the digit *P*?

(a) 1 (b) 6
(c) 7 (d) 9

(b) Given number = 3798125*P*369

When we check the divisibility by 7, we will divide 3798125 by 7 and get 2 as a remainder.

$\therefore$ We will divide the new number 2*P*369 by 7.

Again by divisibility by 7,

$2P36 - 9 \times 2 = 2P18$ will be divided by 7.

Now, this is a small number to check the divisibility by 7 by Trial and Error method.

$\therefore$ Required digit, $P = 6$.

37. From January 1, 2021, the price of petrol (in ₹ per litre) on *m*th day of the year is $80 + 0.1\,m$, where $m = 1, 2, 3, \ldots, 100$ and thereafter remains constant. On the other hand, the price of diesel (in ₹ per litre) on *n*th day of 2021 is $69 + 0.15\,n$ 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

(b) Price of the diesel on *n*th day of the year = $69 + 0.15\,n$

Price of the petrol on *m*th day of the year = $80 + 0.1\,m$

where, $m = 1$ to 100. After which it remains constant.

$\therefore$ Price of the petrol on and after 100th day

$= 80 + 0.1 \times 100$

= ₹ 90

and total number of days till 30th April

$= 31 + 28 + 31 + 30 = 120$ days

Optionwise, from (b) : 20th May means $120 + 20 = 140$ days.

$\therefore$ Price of the diesel $= 69 + 0.15 \times 140 =$ ₹ 90

$\therefore$ The prices of these two fuels are equal on 20th may, 2021.

38. A biology class at high school predicted that a local population of animals will double in size every 12 yr. The population at the beginning of the year 2021 was estimated to be 50 animals. If *P* represents the population after *n* years, then which one of the following equations represents the model of the class for the population?

(a) $P = 12 + 50n$ (b) $P = 50 + 12n$
(c) $P = 50(2)^{12n}$ (d) $P = 50(2)^{n/12}$

(d) Population is getting doubled every 12 yr, and population in the year 2021 is 50 animals.

So, after 12 yr it will be get doubled to 100 animals.

Optionwise, from option (d) : $P = 50 \times 2^{n/12}$

$= 50 \times 2^{12/12} = 50 \times 2$

= 100 animals.

$\therefore$ This value comes out to be way above 100.

39. In a class, 60% of students are from India and 50% of the students are girls. If 30% of the Indian students are girls, then what percentage of foreign students are boys?

(a) 45% (b) 40%
(c) 30% (d) 20%

(d) Let the total number of students be 100.

Students from India = 60% of 100 = 60

In which, 30% are girls

$\therefore$ Number of Indian girls students $= \frac{30 \times 60}{100} = 18$

Total number of girls students = 50% of 100 = 50

$\therefore$ Number of foreign boy students

$= 40 - (50 - 18) = 8$

$\therefore$ Required percentage $= \frac{8}{40} \times 100 = 20\%$

40. A statement followed by conclusion I and conclusion II is given below. You have to take the statement to be true even if it seems to be at variance from the commonly known facts. Read all conclusions and then decide which of the given conclusion(s) logically follows/follow from the statement, disregarding the commonly known facts.

Statement Some radios are mobiles. All mobiles are computers. Some computers are watches.

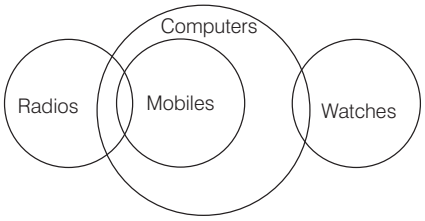
Conclusion I : Certainly some radios are watches.

Conclusion II : Certainly some mobiles are watches.

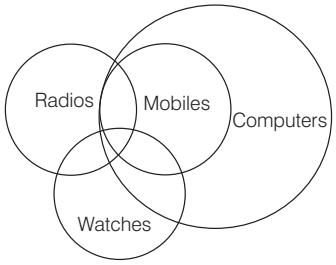
Which one of the following is correct?

(a) Only conclusion I
(b) Only conclusion II
(c) Both conclusion I and conclusion II
(d) Neither conclusion I nor conclusion II

(d) From statement,



Or



∴ **Conclusion**s

I. × II. ×

∴ Neither I nor II follows from the statement.

Directions *Read the following two passages and answer the items that follows. Your answers to these items should be based on the passages only.*

Passage 1

Medieval merchants risked the hazards of the Silk Road to reach the markets of China; Portuguese caravels in the 15th century sailed beyond the bounds of the known world, searching less for knowledge than for gold and spices. Historically, the driver for opening frontiers has always been the search for resources. Science and curiosity are weaker drivers. The only way to open up space, whether the space of solar system or interstellar space is to create and economic engine and that engine is resource extraction.

41. Which one of the following statements best sums up the passage given above?

(a) Wealth generation is the primary motive for any human endeavour.
(b) Space, whether space in solar system or interstellar space, will govern our future economy.
(c) Human beings are motivated to explore new frontiers principally by economic considerations.
(d) Wealth generation is based on the risk-taking behaviour of some men.

(c) The passage states that economic consideration as prime motto for exploration of new world, inventions discoveries even the space exploration, wealth generation was the secondary motive along with science and curiosity.

Passage 2

"…… most people would agree that telling deliberate lies is wrong, except perhaps in certain special situations where more harm will be done by telling the truth. Even the most truthful people probably tell a good many more lies that might be regarded as semantic lies; their use of words contains some measure of falsehood, more or less deliberate".

42. The idea which the first part of the passage mentions is

(a) agreement about telling lies.
(b) disagreement about telling lies.
(c) disagreement about telling the truth.
(d) disagreement about the harm in telling the truth.

(a) Since, the first part of the passage is missing and the given question is related with the first part. However after implying our idea, it can be assumed that the first part is exchanging the idea of agreement in telling lies, while in the following passage they disagree in truth.

43. Which one of the following habits is found more often in good people?

(a) Mixing up the true and false
(b) Intentional mixing up of truth with the false
(c) Falsification of facts
(d) Complete concealment of truth

(b) The passage states that good people intentionally mixes up truth with false to reduce the harm from telling the truth. Sometimes, it is with the intention of preventing others from experiencing psychological harm as well.

44. A pie diagram shows the percentage distribution of proteins, water and other dry elements in the human body. Given that proteins correspond to 16% and water corresponds to 70%. If both proteins and the other dry elements correspond to p%, then what is the central angle of the sector representing p on the pie diagram?

(a) 54° (b) 96° (c) 108° (d) 120°

(c) According to the question,

Percentage of other dry elements in the human body
$= 100 - (70 + 16) = 14\%$

∴ Percentage of both proteins and the other dry elements

i.e., $P = 14 + 16 = 30\%$

∴ Required angle $= \frac{30}{100} \times 360 = 108^{\circ}$

45. Joseph visits the club on every 5th day, Harsh visits on every 24th day, while Sumit visits on every 9th day. If all three of them met at the club on a Sunday, then on which day will all three of them meet again?

(a) Monday (b) Wednesday (c) Thursday (d) Sunday

(b) According to the question,
The next time they will meet again will be the LCM of these time-periods = LCM of (5, 24, 9) = 360 days
∵ Odd number of days in 360 days = Remainder when 360 is divided by 7 = 3
∴ Required day = Sunday + 3 = Wednesday.

46. The difference between a 2-digit number and the number obtained by interchanging the positions of the digits is 54.

Consider the following statements
1. The sum of the two digits of the number can determined only if the product of the two digits is known.
2. The difference between the two digits of the number can be determined.

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

(c) Let the number be $10x + y$.
The number obtained on interchanging the position of the digits = $10y + x$
∴ According to the question, $(10x + y) - (10y + x) = 54$
$\Rightarrow 9(x - y) = 54$
$\Rightarrow x - y = 6$
∴ Statement 2 is correct.
The possible pair of such two digits numbers are (17, 71), (28, 82) and (39, 93).
∴ Respective product of their digits are : $1 \times 7 = 7$; $2 \times 8 = 16$ and $3 \times 9 = 27$.
∴ Statement 1 is correct.

47. *X* said to *Y*, "At the time of your birth I was twice as old as you are at present." If the present age of *X* is 42 yr, then consider the following statements
1. 8 yr ago, the age of *X* was five times the age of *Y*.
2. After 14 yr, the age of *X* would be two times the age of *Y*.

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

(b) Let the present age of *Y* be x years.
According to the question, $42 - x = 2x$
$\Rightarrow 3x = 42 \Rightarrow x = \frac{42}{3} = 14$ yr.
So, at present, the ages of *X* and *Y* are 42 yr and 14 yr respectively.
Statement I Ages of *X* and *Y* 8 yr ago must be $42 - 8 = 34$ yr and $14 - 8 = 6$ yr respectively.
∴ Statement I is not correct.
Statement II Ages of *X* and *Y* after 14 yr must be $42 + 14 = 56$ yr and $14 + 14 = 28$ yr respectively.
∴ Statement II is correct.

48. If the price of an article is decreased by 20% and then the new price is increased by 25%, then what is the net change in the price?
(a) 0% (b) 5% increase
(c) 5% decrease
(d) Cannot be determined due to insufficient data

(a) Let the initial price of the article be ₹ 100.
Now, price of article on decreasing the initial price by 20% = 100 – 20% of 100 = ₹ 80.
Again, new price is increased by 25%, so the new price = 80 + 25% of 80 = 80 + 20 = ₹ 100
∵ Initial price = Final (new) price.
∴ There is 0% change (or no change) in the price.

49. When a certain number is multiplied by 7, the product entirely comprises ones only (1111...). What is the smallest such number?
(a) 15713 (b) 15723 (c) 15783 (d) 15873

(d) As the number comprising all 1's is obtained on multiplied by 7, so it means that 7 is the factor of that number.
Our answer will be the smallest number comprising all 1's that will be divisible by 7.
∵ $\frac{111111}{7} = 15873$
∴ 15873 is the smallest such number.

50. A man completes 7/8 of a job in 21 days. How many more days will it take him to finish the job if quantum of work is further increased by 50%?
(a) 24 (b) 21 (c) 18 (d) 15

(d) Given, $\frac{7}{8}$th of a job is completed in 21 days.
∴ Time taken to complete full work = $\frac{21}{7} \times 8 = 24$ days.
According to the question, work is further increased by 50%.
∴ Number of total days taken = 24 + 50% of 24
= 24 + 12 = 36 days
Since, the man completes the work of 21 days already.
∴ Now, time taken to complete the remaining work
= 36 – 21 = 15 days.

Directions *Read the following two passages and answer the items that follows. Your answers to these items should be based on the passages only.*

Passage 1

Can a democracy avoid being a welfare state for long? Why cannot mass welfare be left entirely to the markets? There is a built-in tension between markets and democracy. Markets do not work on a one-person one-vote principle as democracies do.

What one gets out of the market place depends on one's endowments skills, purchasing power and the forces of demand and supply. Markets reward individual initiative

and skill, and may also lift many from the bottom rungs of society, but some people never get the opportunity to develop skills that markets demand; they are simply too poor and too handicapped; or skill formation takes too long. By creating jobs, markets may be able to help even unskilled people, but capitalism has always witnesssed bursts of unemployment.

51. With reference to the above passage, the following assumptions have been made

1. Modern democracies rely on the market forces to enable them to be welfare states.
2. Markets ensure sufficient economic growth necessary for democracies to be effective.
3. Government programmes are needed for those left behind in economic growth.

Which of the above assumptions is / are valid?

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

(b) With reference to the passage, government programmes are needed to complement the market outcomes, as the markets cannot ensure equity. Government programmes are also required to help those who have not benefitted by the efficient distribution of resoruces of the markets.

Hence, statement 3 is correct.

Passage 2

In our schools, we teach our children all that is there to know about physics, maths and history and what-have-you. But do we teach them about the bitter caste divide that plagues the country, about the spectre of famine that stalks large parts of our land, about gender sensitivity, about the possibility of atheism as a choice, etc.? Equally important, do we teach them to ask questions, or do we teach them only to passively receive our wisdom ? From the cocooned world of school, suddenly, the adolescent finds himself / herself in the unfettered world of university. Here he / she is swept up in turmoil of ideas, influences and ideologies. For someone who has been discouraged from asking questions and forming an opinion, this transition can be painful.

52. Which one of the following statements best reflects the central idea of the passage given above?

(a) School curriculum is not compatible with the expectations of children and parents.
(b) Emphasis on academic achievements does give time for development of personality and skills.
(c) Preparing the children to be better citizens should be the responsibility of the education system.
(d) To be a better citizen, the present world order demands societal and life-coping skills in addition to academic content.

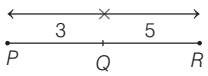
(d) Through the passage, it is clear that, as the present world order demands not only societal and life-coping skills but also academic content for making a better citizen. However, the passage demands for teaching them about the bitter caste divide in our society and also providing knowledge about gender sensitivity.

53. There are three points P, Q and R on a straight line such that $PQ : QR = 3 : 5$. If n is the number of possible values of $PQ : PR$, then what is n equal to?

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

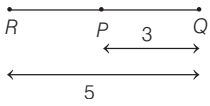
(b) According to the questions,

The number of possible values of $PQ : PR$ will be only 2, *i.e.*, $n = 2$ as.



$\Rightarrow PQ : PR = 3 : 8$

and



$\Rightarrow PQ : PR = 3 : 2$

54. On a chess board, in how many different ways can 6 consecutive squares be chosen on the diagonals along a straight path?

(a) 4 (b) 6 (c) 8 (d) 12

(b) On a chess board's diagonal, 6 consecutive squares can be chosen in 3 ways.

$\therefore$ Total number of ways of choosing 6 consecutive squares on the diagonals along a straight path = 3 + 3 = 6.

55. In the series _b_a_ba_b_abab_aab; fill in the six blanks (_) using one of the following given four choices such that the series follows a specific order.

(a) bababa (b) baabba
(c) bbaabb (d) ababab

(d) Sequences of the given series is as follows,

a b b/a a b / a b b / a a b / a b b / a a b

56. Using 2, 2, 3, 3, 3 as digits, how many distinct numbers greater than 30000 can be formed?

(a) 3 (b) 6 (c) 9 (d) 12

(b) According to the question,

Required number of numbers $= \frac{4!}{2! \times 2!} = 6$

57. Consider the following statements :

1. The sum of 5 consecutive integers can be 100.
2. The product of three consecutive natural numbers can be equal to their sum.

Which of the above statements is/are correct?

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

(c) From statement 1,
Let the 5 consecutive numbers be $x-2$, $x-1$, x, $x+1$ and $x+2$.
$\therefore (x-2)+(x-1)+x+(x+1)+(x+2)=100$
$5x=100 \Rightarrow x=\frac{100}{5}=20$
So, the numbers are 18, 19, 20, 21 and 22.
$\therefore$ Statement 1 is correct.
From statement 2,
We know that, $1\times2\times3=1+2+3=6$
$\therefore$ Statement 2 is also correct.

58. A cubical vessel of side 1m is filled completely with water. How many millilitres of water is contained in it (neglect thickness of the vessel)?
(a) 1000 (b) 10000
(c) 100000 (d) 1000000

(d) According to the question,
Volume of the cube = $(\text{side})^3 = 1\text{m}^3$
$= 1000000$ mL

59. There are 6 persons arranged in a row. Another person has to shake hands with 3 of them, so that he should not shake hands with two consecutive persons. In how many distinct possible combinations can the handshakes take place?
(a) 3 (b) 4 (c) 5 (d) 6

(b) According to the question,
Required possible ways = ${}^6C_3 - (4+3+2+2+2+3)$
$= 20-(4+12)=20-16=4$

60. An amount of money was distributed among A, B and C in the ratio $p:q:r$.
Consider the following statements:
1. A gets the maximum share if p is greater than $(q+r)$.
2. C gets the minimum share if r is less than $(p+q)$.

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

(a) Ratio of distribution of money among A, B and $C = p:q:r$
From statement 1,
If $p>(q+r)$, then p is definitely the largest number.
So, A must have got the maximum share.
$\therefore$ Statement 1 is correct.
From statement 2,
If $r<(p+q)$, then r may or may not be the smallest number.
So, C may or may not have got the minimum share.
$\therefore$ Statement 2 is incorrect.

Directions *Read the following two passages and answer the items that follows. You answers to these items should be based on the passages only.*

Passage 1

The best universities like Harvard and MIT, despite having the luxury of having some truly excellent teachers on their payroll, are increasingly embracing the "flipped classroom" format, where students listen to video lectures at home, and spend class time applying their knowledge, solving problems, discussing examples, etc. Professors guide that discussion and fill in wherever necessary, explaining those bits that seems to be eluding the students and throwing in advanced ideas that happen to be topical. These universities have made their video lectures available free for anyone in the world. They are also encouraging colleges and universities all over the world to integrate these online courses into their own pedagogy, picking the pieces that are appropriate for their needs and building a package around them.

61. Which one of the following statements best reflects the central idea of the passage given above ?
(a) Efficacy of universities would be better in online mode of conducting classroom tuition as compared to conventional method.
(b) Availability of higher education can be made easier and cheaper without diluting the content.
(c) We need not invest much in infrastructure related to higher education and yet develop better human and social capital.
(d) Private sector institutions in higher education as well as coaching institutes can take advantage of this opportunity and thrive well.

(c) The central idea of the passage is development of better human and social capital is more important than investing in infrastructure related to higher education. So that a pool of knowledge at par with other universities can be created, with integration of online courses.

Passage 2

Our cities are extremely vulnerable to climate change because of large concentrations of populations and poor infrastructure. Moreover, population densities are increasing in them but we have not yet developed the systems to address climate change impacts. Our cities contribute to 65 per cent of the GDP, but there are not enough facilities to cater to the needs of the people. It is important to address the issues of air quality, transport, etc., that are vital to identifying sustainable solutions. We need to involve citizens in city planning and create an ecosystem that meets the needs of the people.

62. Which among the following is the most logical and rational inference that can be made from the passage given above?

(a) Our cities need to have well-defined administrative set up with sufficient autonomy.
(b) Ever increasing population densities is a hindrance in our efforts to achieve sustainable development.
(c) To maintain and develop our cities, we need to adopt sustainability related interventions.
(d) Public-Private Partnership mode of development is the viable long-terms solution for the infrastructure and sustainability problems of India.

➘ ***(c)*** We can assume through the passage that climate change caused due to increasing population density and infrastructure. Therefore, to maintain and develop our cities, we need to adopt sustainability related intervention.

63. Jay and Vijay spent an equal amount of money to buy some pens and special pencils of the same quality from the same store. If Jay bought 3 pens and 5 pencils and Vijay bought 2 pens and 7 pencils, then which one of the following is correct?

(a) A pencil costs more than a pen.
(b) The price of a pencil is equal to that of a pen.
(c) The price of a pen is two times the price of a pencil.
(d) The price of a pen is three times the price of a pencil.

➘ (c) Let the price of a pen and a pencil be ₹x and ₹y respectively.

$\therefore$ According to the question,

$$3x + 5y = 2x + 7y$$
$$\therefore \quad 3x - 2x = 7y - 5y$$
$$\Rightarrow \quad x = 2y$$

So, price of a pen is twice as that of a pencil.

64. P scored 40 marks more than Q in an examination. If Q scored 10% less marks than P, then how much did Q score?

(a) 360 (b) 380 (c) 400 (d) 420

➘ ***(a)*** Let the marks scored by Q be x.

So, the marks scored by $P = x + 40$.

According to the question, x = 90% of $(x + 40)$

$$\Rightarrow \quad 10x = 9x + 360$$
$$\Rightarrow \quad 10x - 9x = 360$$
$$\Rightarrow \quad x = 360.$$

65. A person P asks one of his three friends X as to how much money he had. X replied, "If Y gives me ₹ 40, then Y will have half of as much as Z, but if Z gives me ₹ 40, then three of us will have equal amount". What is the total amount of money that X, Y and Z have?

(a) ₹ 420 (b) ₹ 360 (c) ₹ 300 (d) ₹ 270

➘ ***(b)*** Let the amount of money of X, Y and Z be x, y and z respectively.

According to the question,

$$y - 40 = z/2$$
$$\Rightarrow \quad z = 2y - 80 \quad \ldots(i)$$
and $$x + 40 = y = z - 40$$
$$\Rightarrow \quad z = y + 40 \quad \ldots(ii)$$

From eqs. (i) and (ii), we get

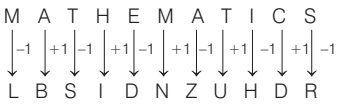
$$2y - 80 = y + 40$$
$$\Rightarrow \quad y = ₹\ 120$$
$$\therefore \quad x = y - 40 = 120 - 40 = ₹\ 80 \text{ and}$$
$$z = y + 40 = 120 + 40 = ₹\ 160.$$

$\therefore$ Total amount of money = 120 + 80 + 160 = ₹ 360.

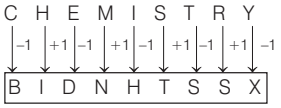
66. In a code language 'MATHEMATICS' is written as 'LBSIDNZUHDR'. How is 'CHEMISTRY' written in that code language?

(a) DIDLHRSSX (b) BIDNHTSSX
(c) BIDLHTSSX (d) DGFLIRUQZ

➘ (b) As,



Similarly,

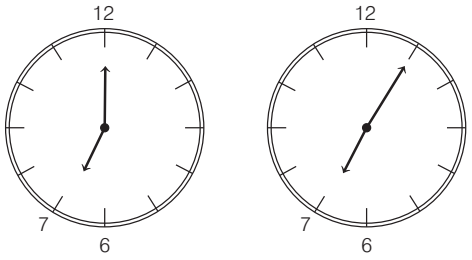


67. At which one of the following times, do the hour hand and the minute hand of the clock make an angle of 180° with each other?

(a) At 7:00 hours
(b) Between 7:00 hours and 7:05 hours
(c) At 7:05 hours
(d) Between 7:05 hours and 7:10 hours

➘ (d) Angle of 180° means that they must be directly opposite to each other.

This will happen a little time after 7:05 hours.



68. In an objective type test of 90 questions, 5 marks are allotted for every correct answer and 2 marks are deducted for every wrong answer. After attempting all the 90 questions, a student got a total of 387 marks. What is the number of incorrect responses?

(a) 9 (b) 13
(c) 27 (d) 43

➘ *(a)* Given, total number of questions = 90 and 5 marks given to each correct answer.

So, maximum marks possible = $90 \times 5 = 450$

According to the question, every incorrect answer will decrease the maximum score by $5 + 2 = 7$ marks.

$\therefore$ Number of incorrect response $= \frac{450 - 387}{7} = \frac{63}{7} = 9$

69. Consider the following addition problem

$3P + 4P + PP + PP = RQ2$; where P, Q and R are different digits.

What is the arithmetic mean of all such possible sums?

(a) 102 (b) 120
(c) 202 (d) 220

➘ *(c)* Given, $3P + 4P + PP + PP = RQ2$

$\Rightarrow 30 + P + 40 + P + 10P + P + 10P + P$

$= 100R + 10Q + 2$

$\Rightarrow \quad 24P + 70 = 100R + 10Q + 2$

The unit digit of the resultant is 2. It will be obtained when 4 is multiplied by P. So, P must be 3 or 8.

If $P = 3$, then, $24P + 70 = 24 \times 3 + 70 = 72 + 70 = 142$ and

If $P = 8$, then, $24P + 70 = 24 \times 8 + 70 = 192 + 70 = 262$

$\therefore$ Arithmetic sum of 142 and 262 = 142 + 262 = 404

$\therefore \quad$ Required mean $= \frac{\text{Sum of terms}}{\text{Total terms}} = \frac{404}{2} = 202$

70. Consider the following multiplication problem:

$(PQ) \times 3 = RQQ$, where P, Q and R are different digits and $R \neq 0$.

What is the value of $(P + R) \div Q$?

(a) 1
(b) 2
(c) 5
(d) Cannot be determined due to insufficient data

➘ (b) Given, $PQ \times 3 = RQQ$

$\Rightarrow \quad (10P + Q) \times 3 = 100R + 10Q + Q$

$\Rightarrow \quad 30P + 3Q = 100R + 11Q$

$\Rightarrow \quad 30P = 100R + 8Q$

The last digit of $30P$ will be 0, as well as that of $100R$.

So, the last digit of $8Q$ must also be 0.

So, the value of Q must be 5.

$\therefore \quad 30P = 100R + 8Q = 100R + 40$

$\Rightarrow \quad 3P = 10R + 4$

If $R = 2$, then $P = 24 / 3 = 8$ (an integer)

$\therefore P = 8, Q = 5$ and $R = 2$

that implies, $85 \times 3 = 255$

So, $\frac{(P + R)}{Q} = \frac{(8 + 2)}{5} = \frac{10}{5} = 2$

Directions *Read the following four passages and answer the items that follows. Your answers to these items should be based on the passages only.*

Passage 1

Nothing can exist in a natural state which can be called good or bad by common assent, since every man who is in a natural state consults only his own advantage, and determines what is good or bad according to his own fancy and insofar as he has regard for his own advantage alone, and holds himself, responsible to no one save himself by any law; and therefore sin cannot be conceived in a natural state, but only in a civil state, which is decreed by common consent what is good or bad, and each one holds himself responsible to the state.

71. Which one of the following statements best reflects the central idea of the passage given above ?

(a) The conceptions of what is right or wrong exist due to the formation of a state.
(b) Unless a ruling authority decides as to what is right or wrong, no man would be morally right.
(c) Man is inherently immoral and selfish in a natural state.
(d) The idea of what is right or wrong is necessary for the survival of human species.

➘ *(a)* According to the passage what is right or wrong exist due to the formation of a state. It is proven by the following lines of- ''sin can not be conceived in a natural state, but only in a civil state, which is decreed by common consent what is good or bad, and each one holds himself responsible to the state.''

Passage 2

In the immediate future, we will see the increasing commodification of many new technologies-artificial intelligence and robotics, 3D manufacturing, custom made biological and pharmaceutical products, lethal autonomous weapons and driverless cars. This will pose conundrums. The moral question of how a driverless car will decide between hitting a jaywalker and swerving and damaging the car has often been debated. The answer is both simple-save the human life - and complex. At which angle should the car swerve-just enough to save the jaywalker or more than enough? If the driverless car is in Dublin, who would take the decision? The Irish Government, or the car's original code writer in California, or a software programmer in Hyderabad to whom maintenance is outsourced? If diffrent national jurisdictions have different fine print on prioritising a human life, how will it affect insurance and investment decisions, including transnational ones?

72. Which of the following statements best reflect the rational, plausible and practical implications that can be derived from the passage given above?

1. Too much globalisation is not in the best interests of any country.
2. Modern technologies are increasingly blurring the economic borders.
3. Innovation and capital have impinged on the domain of the State.
4. Public policy of every country should focus on developing its own supply chains.
5. Geopolitics will have to reconcile to many ambiguities and uncertainties.

Select the correct answer using the codes given below:

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

(c) According to the passage, modern technologies are increasingly diminishing the economic border across the globe. On the other hand innovation and capital have rebounded the domain of the state. However, the passage also suggests, that increasing commodification of many new technologies like artificial intelligence and robotics as well as lethal autonomous weapons will pose severe danger in near future.

Passage 3

The resolution of bankruptcy cases of Indian ranks under the Insolvency and Bankruptcy code should help bring Non-Performing Assets (NPA) situation under some control. Despite the low pace of resolutions by the National company Law Tribunal, the code can be helpful cleaning up bank books in future credit cycles. The recapitalisation of public sector banks too an help increase the capital cushion of banks and induce them to lend more and boost economic activity. But bad debt resolution and recapitalisation are only a part of the solution as they, by themselves, can do very little to rein in reckless lending that has pushed the Indian banking system to its current sorry state. Unless there are systemic reforms that address the problem of unsustainable lending, future credit cycles will continue to stress the banking system.

73. Which one of the following statements best reflects the most logical, rational and practical suggestion implied by the passage given above?

(a) Lending by the banks should be closely monitored and regulated by the Central Government.
(b) Interest rates should be kept low so as to induce banks to lend more, promote credit growth and thereby boost economic activity.
(c) Merger of many banks into a few large banks alone is the long-term solution to make them viable and prevent their bad performance.
(d) Indian banking system requires structural reforms as a long-term solution for bad loans problem.

(d) The passage clearly states that unless there are systematic reforms that specifically address the problem of unsustainable lending, future credit cycles will continue to stress the banking system.

Passage 4

In India the objective of macroeconomic policy is to enhance the economic welfare of the people, and any one wing of such macro policy, monetary or fiscal, cannot independently work without active support of another.

74. Which one of the following best reflects the corollary to the passage given above?

(a) The central bank cannot work independently of the Government.
(b) Government should regulate financial markets and institutions closely.
(c) Market economy is not compatible with the socialist policies of the Government.
(d) Financial sector reforms are required for enhancing the economic welfare of the people.

(a) In the given options (a), is a correct corollary in the passage, because anyone wing of such macro policy, monetary or fiscal cannot independently work without active support of another; as the Central Bank deals with the monetary policy, while the government looks after the fiscal policy.

75. Consider the following table:

Player	Runs scored in the First Innings	Balls faced in the First Innings	Runs scored in the Second Innings	Balls faced in the Second Innings
A	61	99	14	76
B	05	12	50	85
C	15	75	20	50
D	13	55	12	50

Who is the fastest run scorer in the Test Match?

(a) A (b) B
(c) C (d) D

(b) Fastest run scorer means the batsman that has best ratio of run scored to balls faced.

Player	Run scored in two innings	Balls faced in Two innings	Strike Rate (Runs/Balls)
A	61 + 14 = 75	99 + 76 = 175	0.43
B	5 + 50 = 55	12 + 85 = 97	0.57
C	15 + 20 = 35	75 + 50 = 125	0.28
D	13 + 12 = 25	55 + 50 = 105	0.23

Since, best strike rate belongs to batsman B.
∴ Batsman B is the fastest run scorer.

76. Half of the villagers of a certain village have their own houses. One-fifth of the villagers cultivate paddy. One-third of the villagers are literate. Four-fifth of the villagers are under 25 yr of age. Which one of the following statements is certainly correct?

(a) All the villagers who have their own houses are literate.
(b) Some villagers under 25 yr of age are literate.
(c) Only half of the villagers who cultivate paddy are literate.
(d) No villager under 25 yr of age has his own house.

➘ (b) 50% of the villagers have their own house.
20% of the villagers cultivate paddy.
33.33% of the villagers are literate.
80% of the villagers are under 25 yr of age.
∴ At least some of the villagers under 25 yr of age must be literate.

77. 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 answer 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.

➘ (b) From statement 1,
The last day of the month is a Wednesday. However, we do not know the number of days in the month, so we cannot find the day on the 14th of that month.
∴ Statement 1 alone is not sufficient to answer the question.
From Statement 2, 17th of that month is the third Saturday. So, 14th of that month must be a Wednesday.
∴ Statement 2 alone is sufficient to answer the question.

78. Which day is 10th October, 2027?

(a) Sunday (b) Monday
(c) Tuesday (d) Saturday

➘ (a) Since, 2000 is a century leap year, so odd days in 2000 yr = 0
Now, odd days in 26 yr
= Remainder of $(20 \times 1 + 6 \times 2)$ when divided by 7
= 4 days.
Now, odd days from 1st January, 2027 to 10th October, 2027
= Remainder when 283 divided by 7
= 3
Total number of odd days = 4 + 3 = 7
∴ Required day = Sunday.

79. Consider two statements and four conclusions given below. You have to take the statements to be true even if they seem to be at variance from the commonly known facts. Read all conclusions and then decide which of the given conclusion(s) logically follows/follow from the statements, disregarding the commonly known facts.

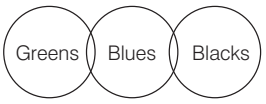
Statement 1 Some greens are blues.
2 Some blues are blacks.

Conclusion 1 Some greens are blacks.
2 No greens is black.
3 All greens are blacks.
4 All blacks are greens.

Which one of the following is correct?

(a) Conclusion 1 and conclusion 2
(b) Conclusion 2 and conclusion 3
(c) Conclusion 3 and conclusion 4
(d) Neither conclusion 1 nor 2 nor 3 and nor 4

➘ (d) From statements,

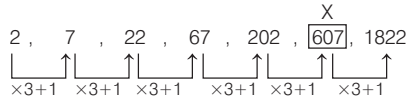


∴ **Conclusions** : 1. ×, 2. ×, 3. ×, 4. ×
∴ Neither conclusion 1 nor 2 nor 3 and nor 4 follow.

80. What is the value of '*X*' in the sequence 2, 7, 22, 67, 202, X, 1822 ?

(a) 603 (b) 605
(c) 607 (d) 608

➘ (c) Sequence of the series is as follows,



∴ *X* = 607.

SOLVED PAPER

2020

SOLVED PAPER 2020

CSAT

Civil Services Aptitude Test

PAPER 2

Time : 2 hrs

MM : 200

INSTRUCTIONS

- There are 80 questions in this paper.
- The answer of any question you are thinking that more than two answers are true. then you must choose the nearest one. There is only one answer to be selected by you.

Penalty for wrong answer

- There are four alternative answers in every question. When you select a wrong answer, then 1/3rd marks of that question is deducted in you total marks.
- If any candidate gives more than one answer and one of them is true but it is treated as a wrong answer and the candidate is penalised for that and 1/3rd marks will be deducted.

Directions (Q.Nos. 1-6) *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.

1. Which one of 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

↘ (d) It is implied from the passage that social sector spending such as health and education sector spending should be increased for large scale job creation. As the service sector can close only half of the job gap prevailing in the country, the other half can be comfortably filled by social sectors such as health and education.

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.

2. 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) Only 3 (c) 1 and 3 (d) Only 2

➘ (a) Explicitly, there is no mention of any institution for protection of citizen's right in digital society, but in order to shield citizen's right from private parties in digital era, institution are citizen's required nevertheless. These institutions should check its functioning from time to time and, hence, ensure its appropriate role in digital society. Also, there is no statement in the passage from which it can be inferred that digital economy is not compatible with the idea of not violating citizen's privacy. Therefore, except assumption (3), both 1 and 2 are correct.

Passage-3

One of the biggest ironies 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.

3. Which one of 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 modernised and further augmented
(c) Wetlands need to be reinforced as your more than just open sources of water
(d) Water supply should not be free of cost so as to prevent its misuse or overuse

➘ (c) It is seen in the passage that through water from wetlands and rivers is used a resource but policy does not recognise it as a part of natural ecosystem. To strengthen capacities of the ecological systems, there is a need to recognise the wetlands as more than just open sources of water. If they are considered as a part of the natural ecosystem, only then their capacity can be increased.

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 think of investing in risky assets as extremely volatile and value eroding. 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.

4. 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 minimised
(b) Risk-taking behaviour should be a necessary component of your 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

➘ (a) It is given in the passage that risk is associated with all the assets that we invest in risky assets. Though we should not assume and live that all the risks are going to manifest at the same time but to reduce the risk. Wealth should be distributed across different kinds of assets. Hence, option (a) is correct suggestion implied in the passage.

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

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

(b) With reference to the above passage, it can surely be assumed that Biotechnology regulation is an evolving process because it is mentioned in the passage that regulation cannot be understood in context of the current generation of GM crops but it should take into account comprehensively all the aspects.

It is clearly mentioned in the passage that biotechnology regulation should take into account socio-economic aspects as well.

There is no mention of people's participation or political executive in regulating biotechnology. Hence, only (1) and (3) are correct.

6. Which one of the 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

(c) The statement that best gives the crux of the passage is–"Biotechnology's role is not confined to current priorities of developing GM crops". It should also include taking into account the socio-economic impacts, minimising negative impacts, developing varieties that can help in climate change mitigation etc.

7. 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

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

$= 5 \times (5 \times 2) \times (5 \times 3) \times (5 \times 2 \times 2) \times (5 \times 5) \times (5 \times 2 \times 3) \times (5 \times 7) \times (5 \times 2 \times 2 \times 2) (5 \times 3 \times 3) \times (5 \times 5 \times 2) \times 5 \times 11 (5 \times 2 \times 2 \times 3)$

$= 5^{14} \times 2^{10} \times 3^5 \times 7 \times 11$

$= (5 \times 2)^{10} \times 5^2 \times 3^5 \times 7 \times 11 \times 5^2$

$= (10)^{10} \times 5^2 \times 3^5 \times 7 \times 11 \times 5^2$

Hence, there will be 10 zeroes at the end of the given product.

8. 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) 37 (d) $(X + Y + Z)$

(b) Given three-digit number = XYZ and $(X + Y + Z)$ is not a multiple of 3.

Now, $(XYZ + YZX + ZXY)$

$= 100X + 10Y + Z + 100Y + 10Z + X + 100Z + 10X + Y$

$= 111X + 111Y + 111Z$

$= 111(X + Y + Z)$

$= 3 \times 37 \times (X + Y + Z)$

Hence, $(XYZ + YZX + ZXY)$ is not divisible by 9.

9. 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

(c) Given, p, q, r and s are natural numbers.

Let $p - 2016 = q + 2017 = r - 2018 = s + 2019 = k$

$\therefore \quad p = k + 2016$

$q = k - 2017$

$r = k + 2018$

$s = k - 2019$

$\therefore$ It is clear from the above, that r is the largest natural number.

10. 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

(a) Since the sum of the given digits 1, 2, 3, 4 and 5 is 15, which is divisible by 3.

Hence, there is no prime number possible which can be obtained by using all the digits 1, 2, 3, 4, 5 without repetition of digits.

11. 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

(b) Given,

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

$$\otimes + 10 + \otimes + 50 + \otimes + \otimes \times 10 + \otimes + \otimes \times 10 + 1$$

$$= 100 + \otimes \times 10 + \otimes$$

$$24 \times \otimes + 61 = 100 + 11\otimes$$

$$13\otimes = 100 - 61 = 39$$

$$\otimes = \frac{39}{13} = 3$$

$\therefore \quad \otimes = 3$

12. 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 feet (b) 0.25 feet (c) 1 feet (d) 3.25 feet

(c) Given, two straight sticks 7.5 feet and 3.25 feet.

The minimum length we can measure = $7.5 - 2 \times 3.25$

$= 7.5 - 6.5 = 1$ feet

13. 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

(c) Given, sequence,

14, 18, 20, 24, 30, 32 ....

After decreasing 1 from each number, we will get a series of prime numbers which is 13, 17, 19, 23, 29, 31

$\therefore$ The next prime number in the sequence is 37.

So, the required next number in the original sequence is $37 + 1 = 38$

14. 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

(b) Let the total number of pages in the book is n then,

$$1 + 2 + 3 + ... n \approx 195$$

$$\frac{n(n+1)}{2} \approx 195$$

$$n^2 + n \approx 390,\ n^2 \approx 390$$

The perfect square closest to 400.

$\therefore \quad n^2 = 400$

$$n = 20$$

$$\frac{n \times (n+1)}{2} = \frac{20 \times 21}{2} = 210$$

So, the student forget to add = $210 - 195 = 15$

Means if there are two pages, then $(7 + 8) = 15$

Therefore, the two required page number are 7 and 8.

15. 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

(c) Given series is as follows

ab ab a/bcbcb/cdcdc/deded

$\therefore$ Missing letters = a, c, c, e

16. 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

(c) According to the question,

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

Here, A, B, C, D, E and F are single digit number.

$\therefore \quad C + F = 12$

$B + 2 + 1 = 10$

$\Rightarrow \quad B = 10 - 3 = 7$

$3 + E + 1 = 9$

$\Rightarrow \quad E = 9 - 4 = 5$

$A + D = 15 = 9 + 6 = 8 + 7$ (not possible as $B = 7$)

Hence, the values of A and D will be 9 and 6.

$\therefore \quad A - D = 9 - 6 = 3$

Hence, the difference of A and D is 3.

17. 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 atleast 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.

(c) From S1 and S2,

Total number of pages = 51

If there is atleast one figure on every page then, there will be atleast 51 figures in the book but we cannot say, if there is 100 or more than 100 figures in the book. Hence, S1 and S2 together are not sufficient to answer the question.

18. 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

(a) Let the number of girls = a

Number of boys = b

$\therefore$ According to the question

$9a + 8b = 8.8(a + b)$

$\Rightarrow \quad 9a - 8.8a = 8.8b - 8b \Rightarrow 0.2a = 0.8b$

$\therefore \quad a = 4b$

Now, again according to the question

$8a + 7b = x(a + b)$

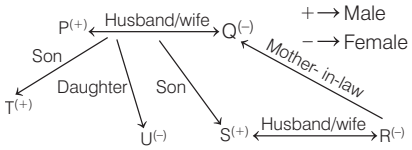
$\Rightarrow 8 \times 4b + 7b = x \times 5b \Rightarrow x = \frac{39}{5} = 7.8$

$\therefore \quad x = 7.8$

19. 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 these

(b) According to given information,



Hence, it is clear from the above diagram that R is the wife of S.

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

(c) Given, 12th January is Sunday.

Number of odd days in a normal year from 12th January to 12th July = 19 + 28 + 31 + 30 + 31 + 30 + 12 = 181

$= 25 \times 7 + 6 =$ 6 odd days

Number of odd days in a normal year from 12th January to 15th July = 19 + 28 + 31 + 30 + 31 + 30 + 15

$= 184 = 26 \times 7 + 2 =$ 2 odd days

Number of odd days in a leap year from 12th January to 12th July = 19 + 29 + 31 + 30 + 31 + 30 + 12

$= 182 = 26 \times 7 =$ 0 odd days

Number of odd days in a leap year from 12th January to 15th July = 19 + 29 + 31 + 30 + 31 + 30 + 15 = 185

$= 26 \times 7 + 3 =$ 3 odd days

In option (c), the number of odd days is zero.

$\therefore$ 12th July will be a Sunday in a leap year.

Directions (Q. Nos. 21-27) *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.

21. 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) Only 3

(b) The passage clearly point towards the fact that, dependence on foreign investment due to their inherit volatility is not an economically sound policy. Domestic private investment is preferred over FDI, as it is less Volatile, their investment avenues are less and they are in better position to took cognizance of domestic sensibilities. Further, in order to raise standards of physical and human capital in India, substantial public investment in education and health should be undertaken.

However, in this passage the requirement of policies to reduce volatility in foreign private investment as well as preferrance of public investment over private investment are not discussed. Hence, answer (b) is correct option.

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 unutilised, and are discharged into the sea every year.

22. 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 codes given below.

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

(a) With reference to the passage, the most rational and practical implications for India are

Interlinking of rivers should be undertaken as the availability of water is highly skewed, seasonal and spatial distribution due to monsoon which occurs only for four months.

A network of dams, canals should be built across the country for proper distribution of water as there is a need for holding rainwater in reservoirs for using it over the year. There is no mention of agriculture, farms and Union Governments regulation over water. Hence, only statements 1 and 2 are correct.

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.

23. 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) Only 1 (b) Only 2 (c) Only 3 (d) 1, 2 and 3

(c) From the given passage it can be assumed that economic freedom has positive impact on building human capital because people prefer to invest in education whenever they are granted economic freedom to fully enjoy its benefits.

It is not mentioned that lower taxes will lead to greater investment in "higher education". It cannot be assumed that investment in education leads to economic freedom. Hence, only statement (3) is correct.

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.

24. 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 crisis in our cities, there is an urgent need to limit the population of cities by adopting an upper limit of population size

(a) In this passage, the need to upgrade the financing mechanism of ULB's has been highlighted, as distributional network of potable water, sewerage infrastructure and sewage treatment plants requires huge investment. Levying user charges can be one such mechanism, hence, option (a) is correct.

25. With 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 households.

Which of the above assumptions is/are valid?

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

(b) From the given passage, it is clear that sustainable delivery of water means much more than supplying water to the households. It involves collection, treatment, supply and sewage treatment plants etc. to ensure that untreated sewage do not enter the natural water sources.

Passage-5

In India, agriculture still engages about half of its workforce, and about 85 per cent 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.

26. 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

(b) According to the information given in the passage, the relative price scenario changed by about 50% in favour of agriculture that boosted private investment in agriculture during 2005-2012. Thus, a good price incentive can trigger investment in agriculture.

As the global prices increase, investment in agriculture increases. Investments lead to higher GDP growth and rising wages that reduces poverty. Thus, rise in global prices help in reducing poverty.

Hence, statements (2) and (4) are correct.

27. Which one of the following statements best reflects the critical message of the passage?

(a) India should create 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

(d) It is clear from the given passage that inclusive agricultural growth is key to reduce poverty in India. It is because as the agricultural growth rises, income of the people rises due to increasing GDP and trade, which helps in reducing poverty as about 50% of India's workforce is engaged in agriculture sector.

28. 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

(c) From S1 : R > P and Q

From S2 : S is not the largest one.
Combining both S1 and S2, R > P ,Q and S

Hence, S1 and S2 together are sufficient to answer the question but neither S1 nor S2 alone is sufficient to answer the question.

29. 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

(d) From S1 : n is a prime number

From S2 : n leaves a remainder of 1 when divided by 4.

According to the question,

$$10 < n < 20$$

From S1 : $n = 11, 13, 17$

From S2 : $n = 13, 17$

Hence, S1 and S2 together are not sufficient to answer the question.

30. 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 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

(c) Let the two numbers be x and y.

From S1 : $x \times y = 21$ ...(i)

From S2 : $x + y = 20$ ...(ii)

From Eq. (i), we get $y = \frac{21}{x}$ and putting this value in Eq. (ii)

$$x + \frac{21}{x} = 20$$

$$\Rightarrow \quad x^2 + 21 = 20x$$

$$\Rightarrow \quad x^2 - 20x + 21 = 0$$

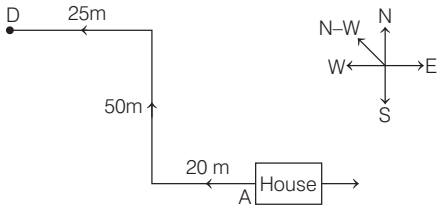
From the above equation, the values of x can be calculated.

Hence, S1 and S2 together are sufficient to answer the question, but neither S1 alone or S2 alone is sufficient to answer the question.

31. A man walks down the backside of his house straight 25 m, then turns to the right and walks 50 m again; then he turns towards left and again walks 25 m. 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

(d)



A = Starting point

D = End point

Hence, now the man is facing North-West direction.

32. 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 6.
II All numbers are divisible by 4.

Which of the above Conclusion(s) 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 and Conclusion II

(a) Only Conclusion I follows as if all numbers are divisible by 2 and 3, then all the numbers will definitely be divisible by LCM (2, 3) i.e. 6 but they will not be divisible by 4.

33. Two Statements are given followed by two Conclusions

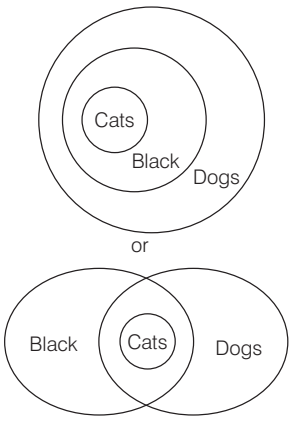
Statements All cats are dogs.
All cats are black.

Conclusion I All dogs are black.
II Some dogs are not black.

Which of the above conclusion(s) logically follows/ follow from the two given statements, 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

(c)



Conclusions (i) ✗ (ii) ✗

∴ Neither Conclusion I nor II follows.

34. 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 the above sequence?

(a) 5 (b) 6
(c) 7 (d) 8

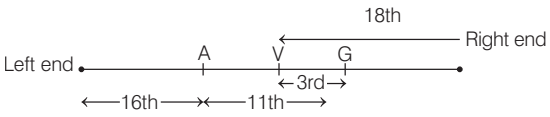
(b) 5 1 4 7 3 9 8 5 7 2 6 3 3 1 5 8 6 3 8 5 2 2 4 3 4 9 6

Hence, there are 6 odd numbers, which are followed by an odd number. The pairs are '51', '73', '39', '57', '31', '15'.

35. 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

(b)



V's position from right hand = 18 th

V's position from left hand = (16 + 11 – 3) = 24 th

Hence, total number of boys in row = (18 + 24 – 1) = 41

36. 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

(d) From S1 : C < D

C > A

C > B

From S3 : A > B

∴ Combining both S1 and S3, we get

D > C > A > B

Hence, youngest is B.

Therefore, S1 and S3 together are sufficient to answer the question.

37. 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

(c) The integers between 1 and 100 which have 4 as a digit but not divisible by 4 are 12 in numbers, which are

14, 34, 41, 42, 43, 45, 46, 47, 49, 54, 74, 94

38. 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) $v = 4u$

(a) If each side of Q is 2 times that of P, then volume of Q = 8 times volume of P

$$\Rightarrow \quad y = 8x \qquad \ldots(i)$$

Mass of Q = 2 times mass of P

$$n = 2\text{ m} \qquad \ldots(ii)$$

Now, $u = \frac{m}{x}$

$$u = \frac{\frac{n}{2}}{\frac{y}{8}} \ldots \text{ [from Eqs. (i) and (ii)]}$$

$$u = \frac{n}{2} \times \frac{8}{y}$$

$$u = \frac{4n}{y}$$

$$u = 4\left(\frac{n}{y}\right)$$

$$\therefore \quad u = 4v \qquad \left[\because \frac{n}{y} = v\right]$$

39. The average age of a teacher and three students is 20 yr. If all the three students are of same age and the difference between the age of the teacher and each student is 20 yr, then what is the age of the teacher?

(a) 25 yr (b) 30 yr (c) 35 yr (d) 45 yr

(c) Let the age of each student be x yr.

$\therefore$ Age of teacher = $20 + x$

According to the question,

Average age = 20 yr

$$\frac{(20 + x) + x + x + x}{4} = 20$$

$$\Rightarrow \quad \frac{20 + 4x}{4} = 20 \Rightarrow 5 + x = 20$$

$$\therefore \quad x = 15 \text{ yr}$$

$\therefore$ The age of teacher = $20 + x$

$= 20 + 15$

$= 35$ yr

40. A person bought a car and sold it for ₹ 300000. If he incurred a loss of 20%, then how much did he spend to buy the car?

(a) ₹ 360000 (b) ₹ 365000
(c) ₹ 370000 (d) ₹ 375000

(d) SP of car = ₹ 300000

Loss = 20%

$$\therefore \text{ CP of car} = \frac{100}{(100 - \text{Loss}\%)} \times \text{SP}$$

$$= \frac{100 \times 300000}{100 - 20}$$

$$= \frac{100 \times 300000}{80}$$

= ₹ 375000

$\therefore$ Amount spent on car = ₹ 375000

Directions (Q. Nos. 41-46) *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.

41. 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 cannot 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

(d) The most critical message from the given passage is that there should not be complete reliance on a single homogeneous food source is not desirable as any disease (fungal infection) can destroy large areas of that crop and can lead to countrywide famines.

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.

42. 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 breastfeed 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 codes given below.

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

(b) The most rational and practical implication of the given passage are

Mothers should be encouraged to breastfeed their children immediately after birth as it is essential to prevent malnutrition in children.

Authorities should ensure vaccination as prescribed because children who are malnourished are prone to infections as well as non-infectious diseases.

From the passage it can also be assumed that delaying marriage and first pregnancy will insure that child born is not malnourished.

Also providing sanitation and safe drinking water ensures that vulnerable children do not catch any disease.

Hence statements (2), (3), (4) and (5) are correct.

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.

43. Which of the following are the most rational inferences that can be made from the 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. Mechanised agriculture is the main cause for stubble burning.

Select the correct answer using the codes given below.

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

(c) The most rational inference that can be made from the passage is

Pulse cultivation causes less pollution as compared to paddy cultivation because the straw of pulse can be ploughed back into the field whereas straw of paddy is burnt by the farmers as they do not have any other option.

Pulse straw can improve soil quality as it decomposes easily and makes the soil fertile.

In cannot be inferred that with pulse cultivation, farmer's income will be higher. It is not mentioned that paddy straw has no usefulness and mechanised agriculture is responsible for stubble burning. Hence, only (2) and (3) are correct.

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 rainwater 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.

44. 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 (b) Only 2
(c) Only 3 (d) 1, 2 and 3

(b) From the given passage, it can be assumed that storage capacity of the dams should not be fully used before or during the monsoon season to store the rainwater of monsoon.

There is no mention of risks involved in holding maximum water in reservoir or role of dams in flood control. Hence, only statement (2) is correct.

Passage-5

Economic liberalisation 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 liberalisation began. And all these years later, four quiet crises confront the economy; agriculture, infrastructure, industrialisation 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.

45. 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 codes given below.

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

(a) From the given passage, it can be logically inferred that role of state should be redefined in the quest for development as economic liberalisation in India was shaped largely by economic problems of the government than by economic priorities of the people.

There is no mention of social sector policies and investments in them in the passage.

Hence, only statement (1) is correct.

46. 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 liberalisation 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) Only 1 (b) Only 2
(c) Both 1 and 2 (d) Neither 1 nor 2

(d) From the given passage, it cannot be assumed that India's economy needs to be greatly integrated with global economy to create large number of jobs.

Economic liberalisation has resulted in joblessness, poverty, inequality etc. Hence, both statements are not correct.

47. 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) Only 1 is the best option for the customer.
(b) Only 2 is the best option for the customer.
(c) Only 3 is the best option for the customer.
(d) All the options are equally good for the customer

(d) Let the price of the article = ₹ 100

Case I

Successive discounts of 10% and 20% and then services tax of 10%

$$\left[\left(\frac{100-10}{100}\right)\times\left(\frac{100-20}{100}\right)\times 100\right]=\frac{90}{100}\times\frac{80}{100}\times 100$$

$$=₹\ \frac{90\times 80}{100}$$

$$\text{Service tax (10\%)} = ₹\ \frac{90\times 80}{100}\times\frac{110}{100}=₹\ 79.2$$

Case II

Successive discounts of 20% and 10% and then service tax of 10%.

$$\left(\frac{100-20}{100}\right)\left(\frac{100-10}{100}\right)\left(\frac{100+10}{100}\right)\times 100$$

$$=\frac{80}{100}\times\frac{90}{100}\times\frac{110}{100}\times 100=₹\ 79.2$$

Case III

Pay a service tax of 10% first, then successive discounts of 20% and 10%.

$$\left(\frac{100+10}{100}\right)\left(\frac{100-20}{100}\right)\left(\frac{100-10}{100}\right)\times 100$$

$$=\frac{110}{100}\times\frac{80}{100}\times\frac{90}{100}\times 100=₹\ 79.2$$

∴ All the options are equally good for the customer.

48. 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

(d) As, G H I
↓ ↓ ↓
7 8 9

$\Rightarrow 789\times 2 = 1578$

and D E F
↓ ↓ ↓
4 5 6

$\Rightarrow 456\times 2 = 912$

Similarly, A B C
↓ ↓ ↓
1 2 3

$\Rightarrow 123\times 2 = \boxed{246}$

49. What is the missing term @ in the following?

ACPQ: BESU :: MNGI : @

(a) NPJL (b) NOJM (c) NPIL (d) NPJM

(d) As,

A	C	P	Q
↓+1	↓+2	↓+3	↓+4
B	E	S	U

Similarly,

M	N	G	I
↓+1	↓+2	↓+3	↓+4
N	P	J	M

∴ @ ⇒ NPJM

50. What is the largest number among the following?

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

(c) $\left(\frac{1}{2}\right)^{-6} = (2)^6 = 64$

$\left(\frac{1}{4}\right)^{-3} = (4)^3 = 64$

$\left(\frac{1}{3}\right)^{-4} = (3)^4 = \boxed{81}$

$\left(\frac{1}{6}\right)^{-2} = (6)^2 = 36$

Hence, largest number is $\left(\frac{1}{3}\right)^{-4}$.

51. 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

(d) $3\frac{1}{2} = \frac{7}{2}$

$8\frac{3}{4} = \frac{35}{4}$

∴ The greatest length 'x' such that $3\frac{1}{2}$ m and $8\frac{3}{4}$ m are integral multiples of x is HCF $\left(3\frac{1}{2}, 8\frac{3}{4}\right)$.

$\Rightarrow \text{HCF}\left(\frac{7}{2}, \frac{35}{4}\right) = \frac{\text{HCF of (7, 35)}}{\text{LCM of (2, 4)}} = \frac{7}{4} = 1\frac{3}{4}$ m

52. 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

(d) Growth rate = Birth rate – Death rate

∴ Growth rates in different years are as follows

1911-1921 = 48.1 – 35.5 = 12.6

1941-1951 = 39.9 – 27.4 = 12.5

1961-1971 = 41.1 – 18.9 = 22.2

1971-1981 = 37.1 – 14.8 = 22.3

Hence, the maximum growth rate is in the year 1971-1981.

53. The recurring decimal representation 1·272727... is equivalent to

(a) 13/11 (b) 14/11 (c) 127/99 (d) 137/99

(b) Let,

$x = 1.27\ 27\ 27$

$x = 1.\overline{27}$ … (i)

$100x = 127.\overline{27}$ … (ii)

Subtracting Eq. (i) from Eq. (ii), we get

$99x = 126$

$\Rightarrow x = \frac{126}{99} \Rightarrow x = \frac{14}{11}$

54. 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

(b) LCM (3, 4, 5, 6)

2	3, 4, 5, 6
3	3, 2, 5, 3
2	1, 2, 5, 1
5	1, 1, 5, 1
	1, 1, 1, 1

$= 2 \times 3 \times 2 \times 5 = 60$

$60 \times 17 = 1020$

1020 will be completely divisible by 60.

∴ The least four digit number which when divided by 3, 4, 5 and 6 and leaves remainder 2 in each case is 1020 + 2 = 1022

55. 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%

(c) Let the total number of man in city = x

Total number of woman in city = y

Total married man = Total married woman

$\frac{40}{100}x = \frac{30}{100}y$

$4x = 3y$ …(i)

Now total population = $x + y$

∴ Percentage of married adult population = $\frac{4x + 3y}{10(x + y)} \times 100$

$= \frac{6y}{y + \frac{3y}{4}} \times 10$ [from Eq. (i)]

$= \frac{6y}{\left(\frac{7y}{4}\right)} \times 10$

$= \frac{24}{7} \times 10 = \frac{240}{7} = 34\frac{2}{7}\%$

56. 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

(a) $\frac{51 \times 27 \times 35 \times 62 \times 75}{100} = \frac{51 \times 27 \times 35 \times 31 \times 3}{2}$

When 51 is divided by 2, then remainder is 1.

Similarly, when 27, 35, 31 and 3 are divided by 2, remainder comes out to be '1' each.

$\therefore \frac{1 \times 1 \times 1 \times 1 \times 1}{2} = \frac{1}{2}$

To find remainder when the number is divided by 100, we must multiply the numerator and denominator by 50.

$\therefore \frac{1 \times 50}{2 \times 50} = \frac{50}{100} \leftarrow$ Remainder

$\therefore$ Required remainder = 50

57. A sum of ₹ 2500 is distributed among X, Y and Z in the ratio $\frac{1}{2} : \frac{3}{4} : \frac{5}{6}$. What is the difference between the maximum share and the minimum share?

(a) ₹ 300 (b) ₹ 350
(c) ₹ 400 (d) ₹ 450

(c) Let the shares received by X, Y and Z be $\frac{1}{2}x$, $\frac{3}{4}x$ and $\frac{5}{6}x$.

Then, $\frac{1}{2}x + \frac{3}{4}x + \frac{5}{6}x = 2500$

$\frac{6x + 9x + 10x}{12} = 2500$

$\Rightarrow \frac{25x}{12} = 2500$

$\therefore x = 1200$

Share of X = ₹ $\frac{1}{2} \times 1200 = 600$

Share of Y = ₹ $\frac{3}{4} \times 1200 = 900$

Share of Z = ₹ $\frac{5}{6} \times 1200 = 1000$

$\therefore$ Required difference = 1000 – 600
= ₹ 400

58. 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

(b) $10^n + 1$

Put $n = 0, 10^0 + 1 \Rightarrow 1 + 1 \Rightarrow 2$

Put, $n = 1, 10^1 + 1 = 10 + 1 \Rightarrow 0 + 1 + 1 \Rightarrow 2$

Put $n = 2, 10^2 + 1 = 100 + 1 \Rightarrow 1 + 0 + 0 + 1 \Rightarrow 2$

$\therefore$ For any whole number 'n', the sum of the digits of the number $(10^n + 1)$ is 2.

59. 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 of 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

(c) Since, there is only shifting of students from one group to another. Hence, there is no change in the total weight and the total number of students present in the three groups.

Therefore, the average weight of the students in the class will remain same.

60. How many different sums can be formed with the denominations ₹ 50, ₹ 100, ₹ 200, ₹ 500 and ₹ 2000 taking at least three denominations at a time?

(a) 16 (b) 15
(c) 14 (d) 10

(a) Number of type of notes (n) = 5 (₹ 50, ₹ 100, ₹ 200, ₹ 500, ₹ 2000)

We know that atleast 3 notes of different denominations to be selected.

Hence, the required number of sum $= {}^nC_3 + {}^nC_4 + {}^nC_5$
$= {}^5C_3 + {}^5C_4 + {}^5C_5$
$= \frac{5!}{3!2!} + \frac{5!}{4!} + \frac{5!}{5!}$
$= \frac{5 \times 4 \times 3!}{3! \times 2} + 5 + 1$
$= 10 + 5 + 1$
$= 16$

Directions (Q. Nos. 61-66) *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 fail. 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.

61. 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.

➘ (c) The most logical inference that can be obtained from the given passage is that India lacks institutional mechanisms to deal with bank failures as there is not any proper system to shut down banks that are weak and loss making.

Passage-2

India has tremendous potential for solar energy. We all realise 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 the required amount of output. The Indian Government has strongly committed to its targets of reducing emissions by 33 per cent 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 houses are wary of investing too heavily in renewable energy at a time when the technology is not yet ready.

62. Which one of 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 be 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

➘ (c) Option (c) is the most logical and rational inference from above passage. As the statements, ''Certain renewable resources are still going through their cost curves and learning curves to get me required amount of output" and ''business houses are wary of investing too heavily in renewable energy at a time when the technology is not yet ready'', points towards limitations associated with technological knowhow and other challenges make renewable energy cost effective in the shorter run.

63. 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) Only 1 (b) Only 2
(c) Both 1 and 2 (d) Neither 1 nor 2

➘ (d) None of the given statement is true. There is no mention of government support or subsidies for technologies that are not ready in the future.

It cannot be assumed from the passage that India's commitment of reducing the emissions by 33% by 2030 shall be on the basis of gas based economy.

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 create mechanisms through which the relevant genes can be altered very precisely.

64. 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 akin to the natural process that helps plants to adapt to the environmental factors.

Which of the above assumptions is/are valid?

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

➘ (c) Genome editing only requires finding that part of plant genome that could be changed to render it less vulnerable to diseases. It does not require transfer of genes from one plant to another.

Through genome editing a particular gene can be altered precisely in a manner similar to the natural processes in which plants mutate then they are under attack from diseases. Thus, both statements (1) and (2) are correct.

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 drains 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 diseases.

65. 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 resources 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

(c) The most critical message from the given passage is that solid waste management should be integrated with the maintenance of drainage and sewerage networks because if unscientific solid waste management combines with poor drainage and dumping of untreated sewage into drains, it leads to spread of water borne diseases because of mosquitoes that breed in these waters.

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.

66. 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

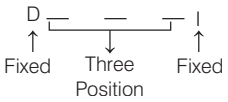
(d) Religious practices of any community are immune to State laws

(b) It can be surely inferred from the given passage that religious freedom under the Constitution is subject to state intervention. It is because, according to the passage, rights such as equality before the law and equal protection of laws is placed above the right to freely profess, propagate and practise religions. It is the state that ensures that no one is denied equal protection of law to any person or group of person for which state can inference in religious freedom.

67. 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

(d) Given word : D E L H I



Hence, the required number of words constructed = 3!

$= 3 \times 2 = 6$

68. A bottle contains 20 L of liquid *A*. 4 litres of liquid *A* is taken out of it and replaced by same quantity of liquid *B*. Again 4 L 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

(c) Initial quantity of liquid $A = 20$ L

After removing 4 L of liquid *A* and adding 4 L of liquid *B*, we get

liquid *A* : liquid *B*

16 L : 4 L $\Rightarrow$ 4 : 1

Now, if we remove 4 L of solution again, and add 4 L of liquid *B*, then

liquid *A* left in the bottle : $\left(16 - \frac{4}{5} \times 4\right)$ L

liquid *B* left in the bottle : $\left(4 - \frac{1}{5} \times 4\right) + 4$

Hence, the required ratio $= \frac{\left(16 - \frac{16}{5}\right)}{\left(4 - \frac{4}{5}\right) + 4}$

$= \frac{\left(\frac{64}{5}\right)}{\left(\frac{16}{5}\right) + 4} = \frac{\left(\frac{64}{5}\right)}{\left(\frac{36}{5}\right)} = \frac{64}{36} = \frac{16}{9}$

69. 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

(c) Total score till 50th innings = $46.4 \times 50 = 2320$ runs

Total score till 60th innings = $60 \times (46.4 + 2.6) = 60 \times 49$
$= 2940$ runs

$\therefore$ Average score in last 10 innings $= \left(\frac{2940 - 2320}{10}\right)$

$= \frac{620}{10} = 62$

70. As a result of 25% hike in the price of rice per kg, a person is able to purchase 6 kg less rice for ₹ 1200. What was the original price of rice per kg?

(a) ₹ 30 (b) ₹ 40 (d) ₹ 50 (d) ₹ 60

(b) Let the original price of rice = ₹ x/kg

$\therefore$ Price after 25% hike = ₹ $\frac{125}{100}x$ /kg

According to the question,

$$\frac{1200}{x} - \frac{1200}{\left(\frac{125x}{100}\right)} = 6$$

$$\Rightarrow \quad \frac{1}{x} - \frac{100}{125x} = \frac{1}{200} \Rightarrow \frac{1}{x} - \frac{4}{5x} = \frac{1}{200}$$

$$\Rightarrow \frac{5-4}{5x} = \frac{1}{200} \Rightarrow \frac{1}{5x} = \frac{1}{200}$$

$\therefore \quad x = 40$

$\therefore$ Original price of rice is ₹ 40 per kg.

71. 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

(a) X completes 20% i.e. $\left(\frac{1}{5}\right)$th of work in 8 days.

$\therefore$ Time taken by X to complete whole work $= 5 \times 8$
$= 40$ days

Y completes 25% i.e. $\left(\frac{1}{4}\right)$th of work in 6 days.

$\therefore$ Time taken by Y to complete whole work $= 6 \times 4$
$= 24$ days

They together complete the work in $= \frac{1}{\left(\frac{1}{40} + \frac{1}{24}\right)}$ days

$= \frac{120}{8}$ days

Time taken to complete 40% of work $= \frac{120}{8} \times \frac{40}{100}$

$= 6$ days

72. A car travels from a place X to place Y at an average speed of v km/h, from Y to X at an average speed of $2v$ km/h, again from X to Y at an average speed of $3v$ km/h and again from Y t to X at an average speed of $4v$ km/h. Then, the average speed of the car for the entire journey.

(a) is less than v km/h (b) lies between v and $2v$ km/h
(c) lies between $2v$ and $3v$ km/h
(d) lies between $3v$ and $4v$ km/h

(b) Let the distance between X and $Y = D$ km

Total time $= \frac{D}{v} + \frac{D}{2v} + \frac{D}{3v} + \frac{D}{4v}$

Average speed $= \frac{\text{Total distance}}{\text{Total time}}$

$$= \frac{4D}{\frac{D}{v} + \frac{D}{2v} + \frac{D}{3v} + \frac{D}{4v}} = \frac{4D}{\left(\frac{12D + 6D + 4D + 3D}{12v}\right)} = \frac{4D}{\left(\frac{25D}{12v}\right)}$$

$= \frac{4 \times 12}{25} v = \frac{48}{25} v = 1.92\, v$

$\therefore$ Average speed lies between v and $2v$ km/h.

73. Consider the following statements:

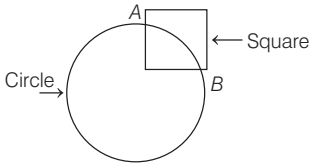
1. The minimum number of points of intersection of a square and a circle is 2.
2. The maximum number of points of intersection of a square and a circle is 8.

Which of the above statements is/are correct?

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

(c) **Statement 1** The minimum number of points of intersection of square and a circle is 2.

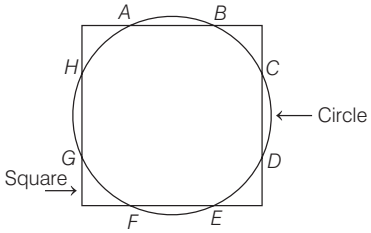
This statement is true.



There are two points of intersection (A and B) between square and a circle.

Statement 2 The maximum number of points of intersection between square and a circle is 8.

This statement is true.



There are maximum eight points of intersection (A, B, C, D, E, F and G) between square and a circle.

Hence, both Statements 1 and 2 are true.