PGDBA 2023

VARC

QUESTION 1

The four sentences (labelled 1, 2, 3, 4) below, when properly sequenced, would yield acoherent paragraph. Decide on the proper sequencing of the order of the sentences and key in the sequence of the four numbers as your answer:

1. Then, when he spoke, he did not explicitly reject the result, though he did notconcede, either.
2. For months, he had insinuated that Luiz Inacio Lula da Silva, his rival, could onlywin if it was rigged.
3. When Lula won by a mere 1.8 per cent points, many people expected Mr. Bolsonaroto contest the result.
4. When Jair Bolsonaro lost his bid for re-election on October 30 he said nothing for44 hours.

   A. 4, 3, 2, 1 , Option ID :- 165,

   B. 4, 1, 2, 3 , Option ID :- 166,

   C. 4, 1, 3, 2 , Option ID :- 167,

   D. 4, 3, 1, 2 , Option ID :- 168,

Correct Answer:- B

QUESTION 2

The four sentences (labelled 1, 2, 3, 4) below, when properly sequenced, would yield acoherent paragraph. Decide on the proper sequencing of the order of the sentences and key in the sequence of the four numbers as your answer:

1. The technocracy of professional sport has managed to impose a soccer of lightningspeed and brute strength, a soccer that negates joy, kills fantasy, and outlaws daring.
2. Luckily, on the field you can still see, even if only once in a long while, some insolent rascal who sets aside the script and commits the blunder of dribbling past the entire opposing side, the referee, and the crowd in the stands, all for the carnaldelight of embracing the forbidden adventure of freedom.

3. **Play has become spectacle, with few protagonists and many spectators, soccer forwatching.**
4. **And that spectacle has become one of the most profitable businesses in the world,organized not to facilitate play but to impede it.**

   A. 4, 3, 2, 1

   B. 3, 4, 2, 1

   C. 3, 4, 1, 2

   D. 4, 1, 2, 3

Correct Answer:- C

QUESTION 3

The four sentences (labelled 1, 2, 3, 4) below, when properly sequenced, would yield acoherent paragraph. Decide on the proper sequencing of the order of the sentences and key in the sequence of the four numbers as your answer:

1. **For example, the 2008-2009 U.S. recession triggered by the bursting of thesubprime mortgage bubble was extremely severe.**
2. **However, while the economic downturn that technically began in December 2007and ended in June 2009 was the longest in the U.S. since World War II, it only lasted about 18 months.**
3. **The major difference between a recession and a depression is that a depression ismuch more severe and long-lasting.**
4. **The U.S. unemployment rate nearly doubled from about 5% to 9.5% and the S&P500 dropped by more than 50% from peak to trough.**

   A. 3, 4, 2, 1

   B. 3, 1, 4, 2

   C. 3, 4, 1, 2

   D. 3, 2, 1, 4

Correct Answer:- B

QUESTION 4

Pick up the best possible option to fill in the blanks: Arriving late for the interview

_____my chances of

getting the job.

   A. Scuppered, Option ID :- 177,

   B. Scrutinised, Option ID :- 178,

   C. Elevated, Option ID :- 179,

   D. Eschewed

Correct Answer:- A

QUESTION 5
Pick up the best possible option to fill in the blanks:
In case of any discrepancy, please _____ to us by email.

    A. **Reply**

    B. **Revert**

    C. **Reverb**
    D. **Relent**

Correct Answer:- A

QUESTION 6-10
The passage below is used in questions 6 to 10. The specific question appears at theend of the passage.

Passage: In the animal kingdom, mimics are a dime a dozen. Stick insects pretend to be twigs. Hawk-moth caterpillars resemble venomous snakes. Edible heliconid butterflies disguise themselves with the wing patterns of noxious ones, and noxious ones copy each other to make it easier for predators to learn what not to eat. All these examples, though, are visual. Auditory mimicry is rarer. But, as he describes in CurrentBiology, Danilo Russo of the University of Naples Federico II thinks he has found a novel case of it. Some bats, he believes, mimic angry bees, wasps and hornets in orderto scare away owls that might otherwise eat them. Dr Russo first noticed the propensity of greater mouse-eared bats to buzz a few years ago, when he was collecting them...to study their ecology. The noise struck him as similar to the sound ofhornets that inhabited the area of southern Italy he was working in. That led him to wonder whether bat buzzing was a form of mimicry which helped its practitioners to scare off would-be predators. To test this idea, he... and a colleague...first recorded the buzzing that captured bats made when handled. Then, having donned suitable protective clothing, they embarked on the more dangerous task of recording the buzzing made, en masse, by four different species of Hymenoptera: European paper wasps; buff-tailed bumblebees; European hornets; and domestic honeybees.... For the next part of their experiment Dr Russo and Dr Ancillotto recruited the services of 16 captive owls—eight barn and eight tawny. Both of these species are known to hunt bats. The researchers put the owls, one at a time, in an enclosure equipped with branches for them to perch on, and also two boxes with holes in them. The boxes resembled the sorts of cavities in trees that owls would explore in the wild for food.
They placed a loudspeaker alongside one of the boxes and, after the birds had settled in, broadcast through it five seconds of uninterrupted bat buzzing and a similar amount of insect buzzing three times in a row for each noise. As a control, they broadcast in like manner several non-buzzing sounds made by bats. During the broadcasts (which occurred in random order) and for five minutes thereafter, they videoed

the owls. The videos were then analysed, by an independent observer, without benefit of their soundtracks. The results were unequivocal. When they heard both the bat buzzings and the hornet buzzings the owls moved as far from the speakers as they could manage. In contrast, when the non-buzzing bat sounds were played, they crept closer. Dr Russo and Dr Ancillotto believe this is the first reported case of a mammal using acoustic mimicry to scare away a predator. They strongly suspect, however, that it is not unique. Anecdotes suggest several birds and also smallmammals, such as dormice—particularly species that dwell in trees and, like dormice, in rock cavities—make buzzing noises when their hidey-holes are disturbed. This has not yet been documented formally as acoustic mimicry. But, given the propensity for venomous buzzing insects to dwell in those sorts of places too, and also the fear that these insects generate in other species, human beings included, Dr Russo thinks this may well be what is going on. He therefore predicts that when these other buzzes are recorded and analysed the results will show that acoustic mimicry by vertebrates of stinging insects is far more widespread than currently realised.

Question 6

In the examples of defensive mechanism exhibited by animals given below,which is the odd one out?

   A. Stick insects pretending to be twigs

   B. Bats mimicking angry bees, wasps and hornets

   C. Hawk-moth caterpillars resembling venomous snakes

   D. Edible heliconid butterflies disguising themselves with the wing patterns

Answer Given:- B

Question 7

From the passage it can be inferred that the species Hymenoptera use the following mechanism for defence:

   A. Mimicry

   B. Aural

   C. Visual

   D. Disguise

Correct Answer:- B

Question 8

 Which of the following outcomes of his experiments would have disprovedMr. Danilo Russo's hypothesis that mimicry was a defensive

mechanism?

- A. **If the owls had moved further away from speakers on hearing buzzing sounds**
- B. **If the owls moved further away from speakers on hearing non-buzzing sounds**
- C. **If the owls had moved closer to the speakers on hearing buzzing sounds**
- D. **If the owls had remained stationary on hearing non-buzzing sounds**

Correct Answer:- C

Question 9

From the passage it can be inferred that the following animal/bird would notbe able to use acoustic mimicry as a defensive mechanism.

- A. **Horses**
- B. **Dormice**
- C. **Rabbits**
- D. **Tawny Owls**

Correct Answer:- A

Question 10

Which of the following mechanisms to prevent robbery would be the best example of human beings using mimicry as a defence mechanism?
Options:-

▪**People leaving lights around the fences on at night when the house is unoccupied,Option ID :- 309,**

▪ **Installation of a sound alarm system in the house to alert neighbours in case of abreak-in., Option ID :- 310,**

▪ **Installation of CCTV surveillance systems. , Option ID :- 311,**

▪ **Using an audio system to play recording of conversations when the house isunoccupied., Option ID :- 312,**

Correct Answer:- D

QUESTION 11-15

The passage below is used in questions 11 to 15. The specific question appears at the end of the passage.
Passage: Familiar though his name may be to us, the storyteller in his living immediacy is by no means a present force. He has already become something remote from us and something that is getting even more distant. To presentsomeone like Leskov as a storyteller does not mean bringing him closer to us but, rather, increasing our distance

from him. Viewed from a certain distance, the great, simple outlines which define the storyteller stand out in him, or rather, they become visible in him, just as in a rock a human head or an animal's body may appear to an observer at the proper distance and angle of vision. This distance and this angle of vision are prescribed for us by an experience which we may have almost every day. It teaches us that the art of storytelling is coming to an end. Less and less frequently do we encounter people with the ability to tell a tale properly. More and more often there is embarrassment all around when the wish to hear a story is expressed. It is as if something that seemed inalienable to us, the securest among our possessions, were taken from us: the ability to exchange experiences. The earliest symptom of a process whose end is the decline of storytelling is the rise of the novel at the beginning of modern times. What distinguishes the novel from the story (and from the epic in the narrower sense) is its essential dependence on the book. The dissemination of the novel became possible only with the invention of printing. What can be handed on orally, the wealth of the epic, is of a different kind from what constitutes the stock in trade of the novel. What differentiates the novel from all other forms of prose literature —the fairy tale, the legend, even the novella—is that it neither comes from oral tradition nor goes into it. This distinguishes it from storytelling in particular. The storyteller takes what he tells from experience—his own or that reported by others. And he in turn makes it the experience of those who are listening to his tale. The novelist has isolated himself. The birthplace of the novel is the solitary individual, who is no longer able to express himself by giving examples of his most important concerns, is himself uncounseled, and cannot counsel others. To write a novel means to carry the incommensurable to extremes in the representation of human life. In the midst of life's fullness, and through the representation of this fullness, the novel gives evidence of the profound perplexity of the living. Even the first great book of the genre, *Don Quixote*, teaches how the spiritual greatness, the boldness, the helpfulnessof one of the noblest of men, *Don Quixote*, are completely devoid of counsel and do notcontain the slightest scintilla of wisdom. If now and then, in the course of the centuries, efforts have been made— most effectively, perhaps, in *Wilhelm Meisters Wanderjahre*—to implant instruction in the novel, these attempts have always amounted to a modification of the novel form. The Bildungsroman, on the other hand, does not deviate in any way from the basic structure of the novel. By integrating the social process with the development of a person, it bestows the most frangible justification on the order determining it. The legitimacy it provides stands in direct opposition to reality. Particularly in the Bildungsroman, it is this inadequacy that is actualized.

Question 11
Question: Why is the 'art of storytelling' coming to an end?

A. We are unable to exchange experiences.

B. We now observe everything from a distance.

C. There is no immediacy in storytelling anymore.

D. The distance and angle of vision for experiential reality has changed.

Correct Answer:- A

Question 12

What is the difference between the novel and the story?

    A. The printing press

    B. The novelist and the storyteller

    C. Perplexity of meaning

    D. The trade of the novel

Correct Answer:- B

Question 13
It can be inferred from the passage that:

    A. The Bildungsroman is an inadequate novel.

    B. The Bildungsroman is a type of a novel

    C. *Wilhelm Meisters Wanderjahre* is a Bildungsroman

    D. The Bildungsroman is an unstructured novel.

Correct Answer:- B

Question 14
What does the author mean by 'frangible justification' in the passage?
    A. Social processes do not play a role in the development of individuals.
    B. In reality, the integration of social process and personal development in a coherentorder does not provide counsel.
    C. The order of social process and personal development needs to be reversed for anovel to offer counsel.

    D. Opposition to reality is an aspect of the Bildungsroman.

Correct Answer:- B

Question 15
What does the author mean by, "Even the first great book of the genre, *DonQuixote*, teaches how the spiritual greatness, the boldness, the helpfulness of one of the noblest of men, Don Quixote, are completely devoid of counsel and do not contain the slightest scintilla of wisdom."

    A. The novel is an individualistic genre.

    B. The novelist is isolated.

    C. The tales of the storyteller are more relatable.

D. The novel gives evidence of the profound perplexity of living.

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The passage below is used in questions 16 to 20. The specific question appears at theend of the passage. Passage: A museum has five halls. Each hall has a separate entry ticket which must be purchased right before entering that hall. The ticket price for each hall is non-zero and unique. Moreover, the ticket price for each hall is a multiple of 30. Hall-3 and Hall-1 have the maximum and minimum ticket prices, respectively. Ticket price of Hall-5 is twice that of Hall-4. A visitor must visit Hall-1 first before deciding the sequence (clockwise, i.e. 1->5->4->3->2 OR anti-clockwise,
i.e. 1->2->3->4->5) of visiting the remaining halls. Three photographers - Amardeep, Barnali, and Chanchal, visited all the halls by purchasing tickets worth Rs 450 each. Moving from one hall to another took five minutes for each of them. Table 1 below provides the time spent by the three photographers in each hall. Visiting a hall is considered complete only after a photographer spends the specified time (asgiven in Table 1) in that hall. Consider the time taken to purchase the ticket as negligible. The floor plan of the museum is given in Fig. 1 (each circle represents a hall, e.g. circle numbered 1 represents Hall-1).

Table 1: Time spent by each person

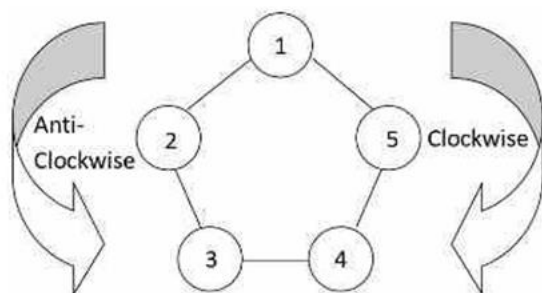| Person	Time spent in each hall
Amardeep	15 minutes
Barnali	10 minutes
Chanchal	20 minutes

Figure 1: Floorplan and the two possible visit sequences The following additional information is given:

 1. Barnali's sequence of visiting the halls was different from

2. **Chanchal entered Hall-1 at 10:08 Hrs. She spent Rs 120 by 10:40 Hrs.**
3. **Amardeep left Hall-2 two minutes after Chanchal entered that hall. Amardeepentered Hall-5 five minutes after Barnali entered that hall.**

Question 16

How much (in Rupees) did Barnali spend on entry tickets by 11:35 Hrs?

A. 30

B. 90

C. 150

D. 210

Correct Answer:- D

Question 17

At what time did Chanchal complete visiting all five halls?

A. 11:48 Hrs

B. 12:08 Hrs

C. 11:53 Hrs

D. 12:13 Hrs

Correct Answer:- B

Question 18

In which of the following halls were Barnali and Chanchal present at thesame time?

A. Hall-1

B. Hall-2

C. Hall-3
D. Hall-4

Correct Answer:- D

Question 19

Choose the correct statement.

A. **By 12:00 Hrs, all photographers had completed visiting all the halls.**

B. **By 12:00 Hrs, only two photographers had completed visiting all the halls.**

C. **By 12:00 Hrs, only one photographer had completed visiting all the halls.**

D. **By 12:00 Hrs, none of the three photographers had completed visiting all the halls.**

Correct Answer:- D

QUESTION 20
Question: Who was the last photographer to complete visiting Hall-3, and at what timedid the last photographer complete visiting Hall-3?

A. **Barnali, 11:40 Hrs**

B. **Barnali, 11:55 Hrs**

C. **Amardeep, 11:40 Hrs**
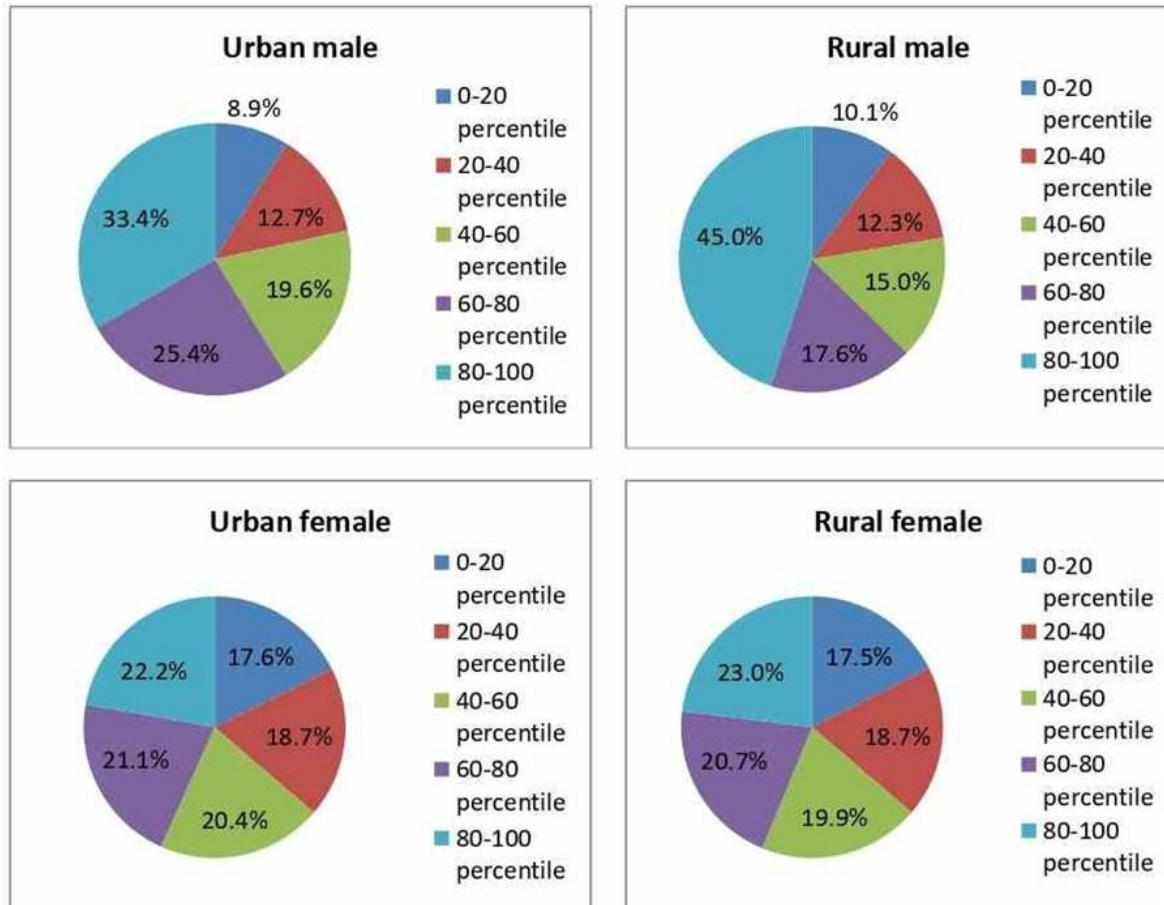D. **Amardeep, 10:55 Hrs**
Correct Answer:- B

DI
QUESTION 21

Question: In a 2007-08 survey conducted by the National Sample Survey Organization (NSSO) with the aim of studying lifetime migrants, the respondents were divided into five equal groups in terms of their monthly per capita expenditure (MPCE). The four charts given below show the decomposition of the lifetime migrants of four categories, into the five.

Urban male

8.9%
12.7%
19.6%
25.4%
33.4%

- 0-20 percentile
- 20-40 percentile
- 40-60 percentile
- 60-80 percentile
- 80-100 percentile

Rural male

10.1%
12.3%
15.0%
17.6%
45.0%

- 0-20 percentile
- 20-40 percentile
- 40-60 percentile
- 60-80 percentile
- 80-100 percentile

Urban female

17.6%
18.7%
20.4%
21.1%
22.2%

- 0-20 percentile
- 20-40 percentile
- 40-60 percentile
- 60-80 percentile
- 80-100 percentile

Rural female

17.5%
18.7%
19.9%
20.7%
23.0%

- 0-20 percentile
- 20-40 percentile
- 40-60 percentile
- 60-80 percentile
- 80-100 percentile

If urban males, rural males, urban females and rural females comprise 16.1%, 35.3%, 15.0% and 33.5% of the total population, then the percentage of rural residents among all lifetime migrants belonging to the 20-40 percentile class of MPCE is approximately

A.15.4%
B.49.7%
C.68.6%
D.68.9%

Correct Answer:- C

QUESTION 22
Question: The table below shows the aggregate quantities of iron ore lumps sold from the mines of eight Indian states during 2017-20, along with the aggregate sale values.

| State	Aggregate quantity sold (in million tonnes)	Aggregate value of sales (in ₹ million)
Odisha	313104.8	281373.5
Chhattisgarh	104738.5	131796.0
Karnataka	80152.7	93870.3
Jharkhand	25542.6	65771.0
Madhya Pradesh	1148.5	970.7
Rajasthan	139.7	218.3
Andhra Pradesh	982.9	1022.5
Goa	2150.0	1640.7

The maximum average unit value of transaction (in per tonne) of iron ore lumps across the eight states was approximately

A. 1.963   B. 2.458.   C.1.563   D. 2.575

Correct Answer:- D

QUESTION 23
Question: The chart below shows the share of speakers of the 21 scheduled languages of India (apart from Sanskrit) at times of three successive Censuses, arranged in decreasing order of the number of speakers.

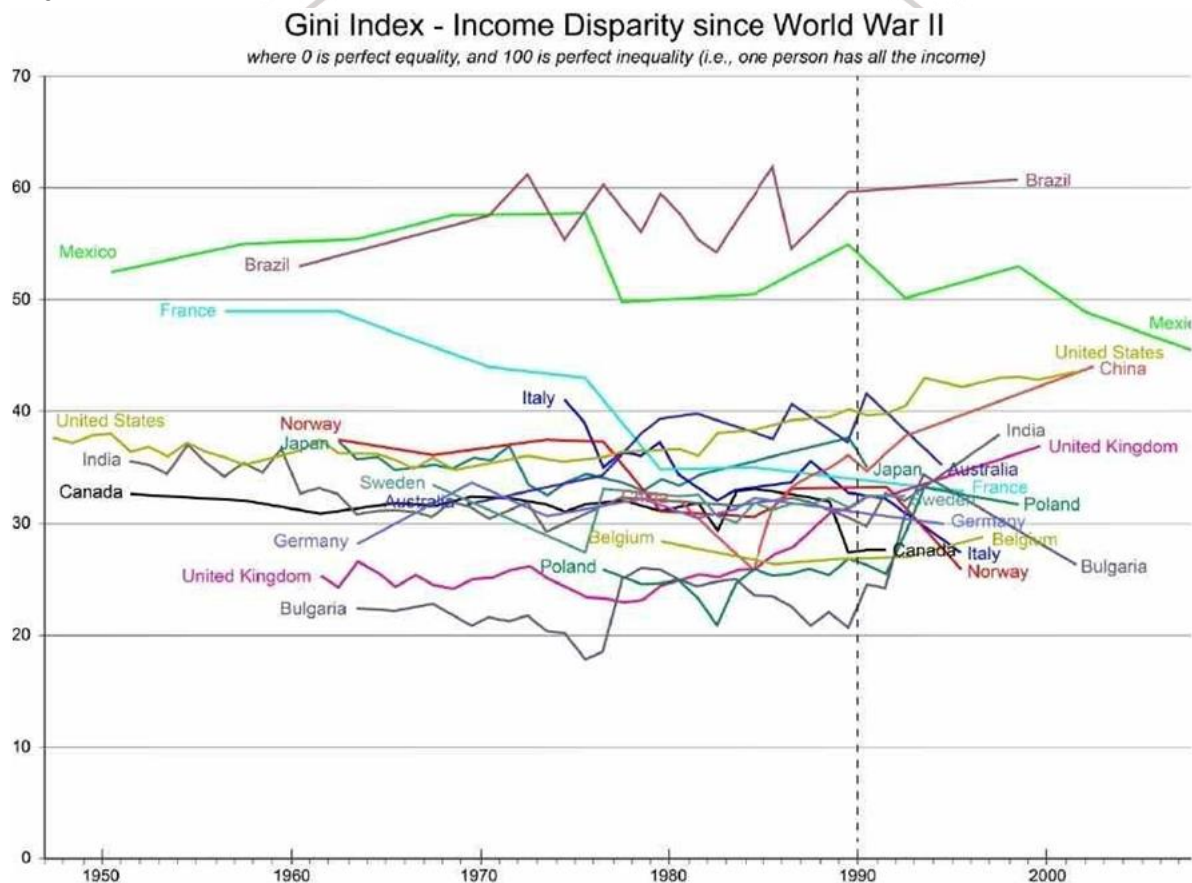National share of speakers in scheduled languages of India
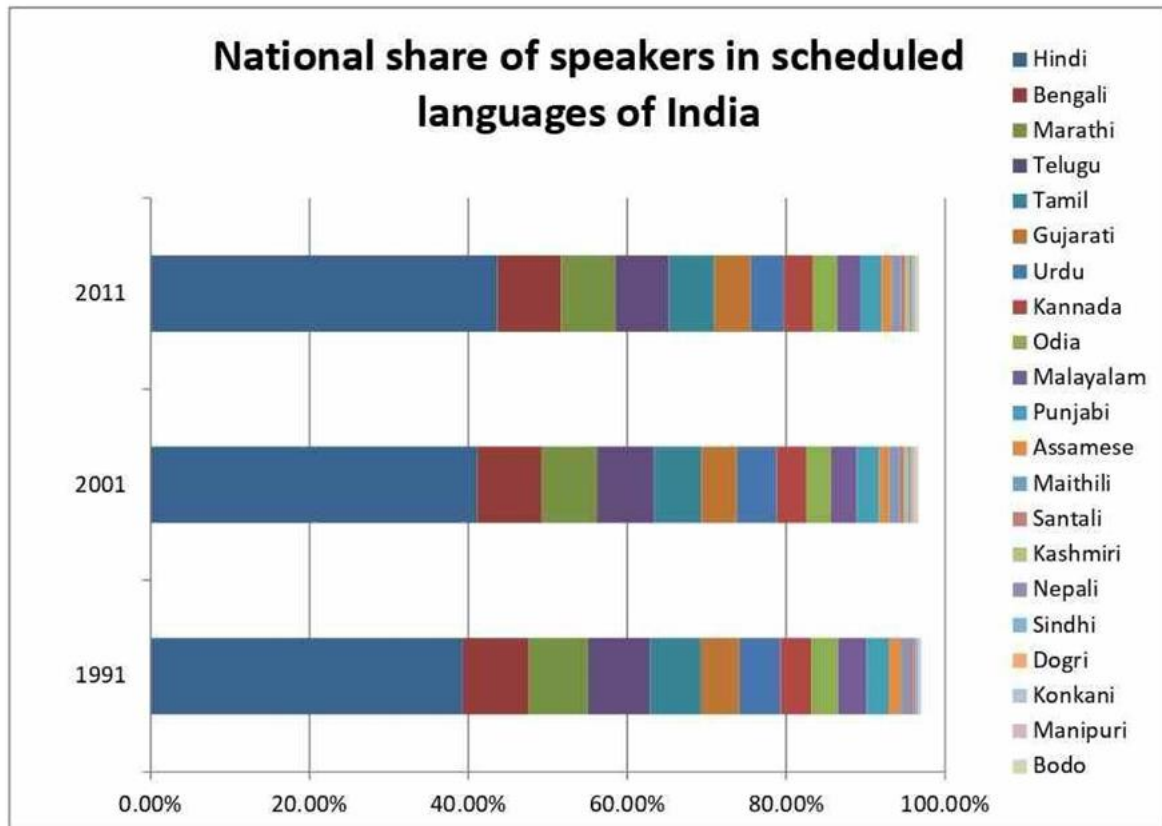
The number of scheduled languages (among the twelve that have the largest shares of speakers), which had a faster growth over the two decades in their national share of speakers than Hindi, is

A. 0. B. 1 C. 2 D. 3

Correct Answer:- A

QUESTION 24

Question: The line graphs displayed below show the trajectories of the Gini index, an indicator of income disparity, in seventeen countries since World War II.

Gini Index - Income Disparity since World War II
where 0 is perfect equality, and 100 is perfect inequality (i.e., one person has all the income)

According to the information given in the graphs, the country that has had the fastestdecrease in the Gini Index since 1990 is

A. Mexico B. Norway C. Australia D. Italy

Correct Answer:- B

QUESTION 25

Question: The apex decision making body of an institution holds periodic meetings, where a number of proposals are placed on its agenda for

consideration. The proposals are either resolved (accepted or rejected) or referred to a committee for preparatory work. The pending proposals are placed again on the agenda of the next meeting,

after the end of the preparatory work by the committee. The table below shows the number of proposals (new or pending from the previous meeting) on agenda and the summary of resolutions, as compiled from the records of a few successive meetings of the decision making body.

Meeting serial number	Number of proposals on agenda	Number of proposals resolved	Number of proposals referred to a committee
1	15	10	5
2	15	8	5
3	14	8	4
4	15	10	5
5	10	5	4
6	15	9	5
7	19	12	6
8	14	7	4
9	14	9	5
10	13	8	5

The proportion of new proposals among all proposals considered in a meeting, computed from the aggregate of the last nine meetings, was approximately

   A. 0.5 B. 0.667 C. 0.75 D. 0.681

Correct Answer:- B

QUANTITIVE APTITUDE

QUESTION 26
The coefficient of $x^2 y^6 z^4$ in the expansion of $(yz + xy)^6 (1 - \frac{z}{x})^6$ is

   A. 27720 B. 15   C. 33   D. 276

Correct Answer:- B

QUESTION 27
The sums of the first n terms of two arithmetic progressions are in the ratio of $(7n + 1):(4n + 27)$. The ratio of their 11th term is

   A. 4:3   C. 5:4   D. 78:71   E. 148:111

Correct Answer:- Remarks: Full marks awarded to all.

QUESTION 28

The value of the integral $\int_0^{\pi/2} \frac{sinx}{sinx+cosx} dx$ is

A. $\frac{\pi}{4}$ B. $\frac{\pi}{2}$ C. п   D. п + 2

Correct Answer:- A

QUESTION 29
A man standing on the bank of a river observes that the angle subtended by a tree on the opposite bank is 60°. When he goes 48 meters away from the bank along the line joining the person and the tree, he finds the angle to the tree to be 30°. Then the height of the tree is

A. $24\sqrt{3}$ meters   B. $\sqrt{3}$ meters   C. $4\sqrt{3}$ meters   D. 26 meters

Correct Answer:- A

QUESTION 30
If the line $3x + 4y - 7 = 0$ divides the line segment joining the points (2, 1) and (-2, 1) in the ratio $\alpha:1$, then the value of α is

A. $\frac{1}{3}$ B. 3   C. 1   D. $\frac{1}{2}$

Correct Answer:- A

QUESTION 31
If p, q, r are strictly positive real number, and $px + qy + rz = 0$, $qx + ry + pz = 0$ and $rx + py + qz = 0$, then there is a real number λ≠1 such that $x:y:z$ is the same as

A. $1: \lambda : -\lambda^2$
B. $1 : \lambda^2 : \lambda$
C. $1 : \lambda : \lambda^2$
D. $1 : -\lambda : \lambda^2$

Correct Answer:- A

QUESTION 32
The number of functions $f : \{1, 2, 3, 4, 5\} \rightarrow \{1, 2, 3, 4, 5\}$ such that $f(6 - i) = f(i)$ for $i = 1, 2, 3, 4, 5$ is

A. 100
B. 125
C. 25
D. 115

Correct Answer:- B

QUESTION 33

Let $P(x)$, and $Q(x)$ be two distinct polynomials with degree at most 2. Let $a_0, \ldots, a_{n-1}$ be distinct elements of R. Consider the following set

$$X = \{i \in \{0, 1, \ldots, (n-1): P(a_i) \neq Q(a_i)\}\}.$$

Which of the following is always correct?

    A. The number of distinct elements in the set X is at least $(n-2)$.

    B. The number of distinct elements in the set X is less than $(n-2)$.

    C. The number of distinct elements in the set X is greater than $(n-2)$.

    D. The number of distinct elements in the set X is equal to $(n-2)$.

Correct Answer:- A

QUESTION 34

The area enclosed by the curves $y = \cos^{-1} x$ and $y = \sin^{-1} x$ over the range $0 \leq x \leq \frac{1}{\sqrt{2}}$ is

    A. $\sqrt{2} - 1$

    B. $1 - \frac{1}{\sqrt{2}}$

    C. $\frac{\pi}{4}$

    D. $\frac{\pi}{4\sqrt{2}}$

Correct Answer:- Remarks: Full marks awarded to all

QUESTION 35

Let $f(x) = \begin{cases} x^\alpha \sin\frac{1}{x} & if\ x > 0 \\ 2x^3 + x^2 - 2x + \beta & if\ x \leq 0 \end{cases}$ be a continuous function. Then,

    A. $\alpha < 1$ and $\beta > 0$

    B. $\alpha \geq 1$ and $\beta = 0$

    C. $-1 < \alpha < 1$ and $\beta = 0$

    D. $\alpha > 1$ and $\beta < 0$

Correct Answer:- B

QUESTION 36

Let PQR be a right-angled triangle with the right angle at P and the angles θ_1 and θ_2 at Q and R, respectively. Let the length of PQ be $\sqrt{2}$ and the length of RP be 3. Then the value of $\cot(\theta_1) + \cot(\theta_2)$ is

A. $\frac{\sqrt{11}}{3}$

B. $\frac{11}{3\sqrt{2}}$

C. $\frac{3\sqrt{2}}{11}$

D. $33\sqrt{2}$

Correct Answer:- B

QUESTION 37

The value of $\frac{2}{0!+1!+2!} + \frac{3}{1!+2!+3!} + \frac{n}{(n-2)!+(n-1)!+n!}$ is

A. $1 + \frac{1}{n}$

B. $1 - \frac{1}{n}$

C. $1 - \frac{1}{n!}$

D. $1 + \frac{1}{n!}$

Correct Answer:- C

QUESTION 38

Let $M = \begin{bmatrix} 0 & 1 & -\alpha \\ -1 & 0 & 5 \\ \alpha & -5 & 0 \end{bmatrix}$ and $y = \begin{pmatrix} y_1 \\ y_2 \\ y_3 \end{pmatrix}$, where α is non-zero and y_1, y_2, y_3 are real numbers. Let $Mx = y$ for some vector x. Then the value of $x^T y$ is

A. α

B. $-\alpha$

C. 0

D. αy_2

Correct Answer:- C

QUESTION 39

If w, x, y, z are positive real numbers then the least value of $(w + 2x + 3y + 4z)\left(\frac{1}{w} + \frac{1}{2x} + \frac{1}{3y} + \frac{1}{4z}\right)$ is

A. 16

B. $\frac{125}{6}$

C. 20

D. 9

QUESTION 40

A government office assigns a distinct license plate for each vehicle registered under it. Each licence plate contains two letters of the English alphabet followed by four digits. In order to avoid confusion no licence plate is allowed to contain both the letter O and the number 0. What is the maximum number of vehicles that can be registered by this office?

A. 10685236

B. 6584611

C. 6760000

D. 4435236

QUESTION 41

Consider the function $f(x) = \begin{cases} \frac{1-\cos(x)}{x^2} & for\ x \neq 0 \\ 1 & if\ x = 0 \end{cases}$

Then, which of the following statements is correct?

A. f has a discontinuity and it is not removable

B. f has a discontinuity and it is removable

C. f is continuous everywhere and is differentiable

D. f is continuous everywhere but is not differentiable

QUESTION 42

Let f be a function defined by $f(x) = \begin{cases} x^2 \sin\frac{1}{x} & for\ x \neq 0 \\ 0 & if\ x = 0 \end{cases}$

Then, which of the following statements is correct?

A. f is differentiable at 0, but $f'(x)$ is not continuous at 0

B. f is not differentiable at 0

C. f is differentiable at 0, and $f'(x)$ is continuous at 0

D. f is differentiable at 0, and $f'(x)$ is not continuous at 0 but $\lim_{x \to 0} f'(x)$ exists.

Correct Answer:- A

QUESTION 43

The equation of the straight line of slope $\frac{5}{2}$, which touches the parabola $y^2 = 5x$, is

   A. $5x + 2y + 1 = 0$
   B. $5x - 2y + 1 = 0$
   C. $5x + 2y - 1 = 0$
   D. $5x - 2y - 1 = 0$

Correct Answer:- B

QUESTION 44

The domain of the function $f(x) = \sqrt{\log_{10}\left(\frac{3x - x^2}{2}\right)}$ is

   A. $(1, 2)$
   B. $[1, 2]$
   C. $(0, 3)$
   D. $(0, 1] \cup [2, \infty)$

Correct Answer:- B

QUESTION 45

Suppose $\sin\theta = \frac{3}{5}$, where θ is an acute angle. Then the value of $\left(500 \sin^4 \frac{\theta}{2} + 400 \sin^2 \frac{\theta}{2}\right)$ is

   A. 65
   B. 5
   C. 45
   D. 40

Correct Answer:- C

QUESTION 46

The value of $\lim_{x \to 0} (1 + 2x)^{(x+3)/x}$ is

   A. e
   B. e^6
   C. e^4
   D. 1

QUESTION 47
If there are 10 red balls and 12 blue balls, and these are arranged by drawing one ball at a time at random, then what is the probability that the last ball in the order is of color red?

A. $\frac{10}{22}$

B. $\frac{10!}{22!}$

C. $\frac{1}{2}$

D. $\frac{12}{22}$

Correct Answer:- A

QUESTION 48
Consider the following figure, where each square is a house. Some pairs of houses are connected by a narrow lane, as indicated in the diagram by connecting lines.
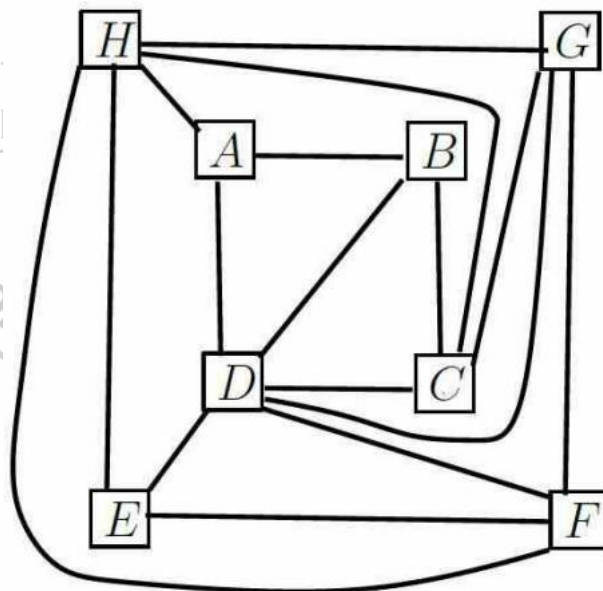
Now, the owners decide to paint these houses (each with a single color) keeping in mind that two connected houses can't be painted with the same color. What will be the minimum number of different colors needed to paint all these houses?

A. 2

B. 3

C. 4

D. At least 5

Correct Answer:- B

QUESTION 49

In a (8 x 8) chessboard, numbers are placed on each of the 64 squares such that the number on each square is the average of its neighbouring squares (that is, the squares with which it shares a side). Also, it is known that the sum of all the numbers is 640. Which of the following is true:

A. There exists a way of placing the numbers in the chessboard such that the average of the numbers on the four corner squares is strictly greater than 10

B. There exists a way of placing the numbers in the chessboard such that the product of all the numbers must be strictly less than 10^{64}

C. There exists a way of placing the numbers in the chessboard such that the average of the numbers on the four corner squares is strictly less than 10

D. The number of ways the chessboard can be filled subject to the given conditions is less than 10

Correct Answer:- D

QUESTION 50

The equation of locus of point P which maintains the distance from two fixed points $R = (0, 2)$ and $S = (0, -2)$ satisfying the equality $|RP + SP| = 6$ is

A. $\frac{x^2}{5^2} + \frac{y^2}{9^2} = 1$

B. $\frac{x^2}{5} + \frac{y^2}{9} = 1$

C. $\frac{x^2}{5^2} - \frac{y^2}{9^2} = 1$

D. $\frac{x^2}{5} - \frac{y^2}{9} = 1$

Correct Answer:- B

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