PGDBA-2018

Duration: Three Hours | *Maximum Marks:* 150

Read the following instructions carefully.

1. Do not open the seal of the Question Booklet until you are asked to do so by the invigilator.
2. On the **OMR sheet**, using ONLY a **blue/black ball point pen**, darken the appropriate bubble under each digit of your registration number. Write your registration number, your name and put your signature at the specified location using a **blue/black ball point pen.**
3. This Question Booklet contains a total of **24** pages including blank pages for rough work. After you are permitted to open the seal, please check all pages and report discrepancies, if any, to the invigilator.
4. There is a total of **50** questions carrying **150 marks**. Each of these questions is a Multiple-Choice-Question (**MCQ**). Every question has only **one** correct answer. Questions must be answered on the **OMR sheet** by darkening the appropriate bubble (marked A, B, C, D) using **ONLY a blue/black ball point pen** against the question number. **For each question, darken the bubble of the correct answer**. More than one bubble darkened against a question will be treated as a **wrong answer**.
5. Each correct answer to a question will result in **three**(3) **marks**, unattempted question will result in **zero** (0) **mark** and wrong answer to a question will result in **minus one** (−1) **mark**.
6. Questions **Q.1–Q.15** belong to **Verbal Ability** section, Questions **Q.16–Q.20** belong to **Logical Reasoning** section, Questions **Q.21–Q.25** belong to **Data Interpretation and Data Visualization** section and Questions **Q.26–Q.50** belong to **Quantitative Aptitude** section.
7. Mobile phones, calculators, books, charts, graph sheets, tables or any other communication and/or computing devices are **NOT** allowed in the examination hall.
8. Rough work should be done on the question booklet itself. Blank pages are also provided at the end the question booklet for rough work. **No extra sheets will be provided for rough work**.
9. Before the start of the examination, write your name and registration number in the space provided below using a **blue/black ball point pen**.
10. You are not allowed to leave the examination hall before **1:30 PM**.

Name	[redacted]
Registration Number	

Q.1 – Q.15: VERBAL ABILITY

Instructions for Questions 1 and 2: **In each of the questions a word has been used in sentences in four different ways. Choose the option corresponding to the sentence in which the usage of the word is incorrect or inappropriate.**

Q1.Complement

A. The airline provided guests with gift hampers as a complement to their loyalty.
B. The new curtains that were used were a complement to the walls.
C. The economic crisis of that decade had its complement in a political crisis in the next.
D. The objective of that session was to teach which colours complement each other.

Q2. Glow

A. I saw her glow with pride as she described her son's achievements.
B. The glow on her face was testimony to her embarrassment.
C. The bonfire cast a glow on the surrounding darkness.
D. The glow on her face was an indication of her sullenness.

Q.3. Arrange the sentences in the most logical order to form a coherent paragraph. From the given options (A, B, C, D) choose the most appropriate sequence.

i. Big Tobacco is doing nothing illegal by producing and marketing cigarettes.
ii. Even so, regulators weighing up how to treat safer alternatives to cigarettes are often too harsh.
iii. No wonder people are cynical when they hear tobacco bosses evangelise about e-cigarettes.
iv. The industry has an inglorious history of lying about the effects of cigarettes on human health.

A. (i), (iv), (iii), (ii)
B. (iv), (iii), (ii), (i)
C. (i), (ii), (iv), (iii)
D. (iv), (i), (iii), (ii)

Q.4. Arrange the sentences in the most logical order to form a coherent paragraph. From the given options (A, B, C, D) choose the most appropriate sequence.

i. The data came from the UK Biobank, which contains genetic and medical data from half a million people.
ii. Intriguingly, this analysis suggests genetic contributions to intelligence and educational achievement are currently disfavoured by natural selection.
iii. Positive correlation means an association with successful reproduction; negative one means exactly the opposite.
iv. A study just published uses a new statistical method to examine how genetic contributions to certain human traits such as intelligence correlate with how many children a person has.

A. (iii), (ii), (iv), (i)
B. (iv), (i), (iii), (ii)
C. (iv), (ii), (iii), (i)
D. (iv), (i), (ii), (iii)

Q.5. Arrange the sentences in the most logical order to form a coherent paragraph. From the given options (A, B, C, D) choose the most appropriate sequence.

i. I am confident that you gentlemen will review without passion the evidence you have heard, come to a decision, and restore this defendant to his family.
ii. I'm no idealist to believe firmly in the integrity of our courts and in the jury system—that is no ideal to me, it is a living, working reality.
iii. A court is only as sound as its jury, and a jury is only as sound as the men who make it up.
iv. Gentlemen, a court is no better than each man of you sitting before me on this jury.

A. (ii), (iv), (iii), (i)
B. (i), (ii), (iii), (iv)
C. (iv), (iii), (i), (ii)
D. (iii), (iv), (i), (ii)

Instructions for Questions 6 to 9: Read the passage and choose the most appropriate answer for the questions that follow.

In my research on leadership transitions, I have observed that career advances require all of us to move way beyond our comfort zones. At the same time, however, they trigger a strong countervailing impulse to protect our identities: When we are unsure of ourselves or our ability to perform well or measure up in a new setting, we often retreat to familiar behaviours and styles.

But my research also demonstrates that the moments that most challenge our sense of self are the ones that can teach us the most about leading effectively. By viewing ourselves as works in progress and evolving our professional identities through trial and error, we can develop a personal style that feels right to us and suits our organizations' changing needs.

That takes courage, because learning, by definition, starts with unnatural and often superficial behaviours that can make us feel calculating instead of genuine and spontaneous. But the only way to avoid being pigeonholed and ultimately become better leaders is to do the things that a rigidly authentic sense of self would keep us from doing.

The word "authentic" traditionally referred to any work of art that is an original, not a copy. When used to describe leadership, of course, it has other meanings—and they can be problematic. For example, the notion of adhering to one "true self" flies in the face of much research on how people evolve with experience, discovering facets of themselves they wouldnever have unearthed through introspection alone. And being utterly transparent—disclosing every single thought and feeling—is both unrealistic and risky.

Q6. From the passage, we can infer that

A. the author believes that in order to be authentic one should remain true to oneself
B. the author believes that authenticity could prevent us from trying out new styles
C. authenticity is an enabling characteristic in the context of leadership
D. authenticity involves spontaneous behaviour that leads to risky outcomes

Q7. The term "works in progress" in the passage, refers to

A. an assumption that individuals have a lot of growing up to do
B. a belief that good leaders do not have areas where they can improve
C. an assumption that all humans progress and change for the better
D. a belief that individuals can change as they encounter new experiences

Q8. For the author, a leadership transition requires a manager to
A. change and adapt to new role requirements
B. avoid being stereotyped by others
C. not share all his thoughts and feelings
D. avoid copying other's styles

Q9. The most appropriate title for this passage would be
A. Leadership Planning
B. The Authenticity Paradox
C. Can One be True to Oneself?
D. Works in Progress

Instructions for Questions 10 to 15: Read the passage and choose the most appropriate answer for the questions that follow.

As rough sleeping rises nationally, the exact scale of the crisis remains hard to capture. The official data shows that in England, rough sleeping has risen for six years in a row. The latest figures estimated that 4,134 people bedded down outside in 2016, up 16% on the previous year. Though London remains the centre of rough sleeping, accounting for 23% of the national total (and in Westminster, with 260 rough sleepers, the highest number of cases), the rate is increasing much faster outside the capital, in places such as Brighton, Manchester and Birmingham.

Each winter across the country, councils send teams of volunteers to conduct night-time counts of all the rough sleepers in the borough to assess how acute the problem is. Recent counts in the homelessness hotspots of Cambridge and Hackney, east London, reveal how the problem is evolving.

"This is their bedroom you are entering. Be respectful of that," warned the organiser of the Cambridge count, before teams set out to count rough sleepers in the historic centre in the early hours of a Friday. For bedroom, read shop doorway, church graveyard, or multi-storey car park – anywhere in the cold night air where a street sleeper might hope to find a yard or two of dry shelter and, if they are lucky, a degree of privacy.

At 3 am, as the last of the evening's city-centre revellers are going home, the teams set out. This is the time when rough sleepers consider it safe enough and sufficiently quiet to bed down. Dotted along a line of shops on a main shopping street were several people in brightly coloured sleeping bags in doorways, surrounded by the paraphernalia of street life: plastic bags stuffed with belongings, cardboard under sheets to insulate them from the cold, the odd half-empty wine bottle.

There are strict definitions of what constitutes a rough sleeper for the purposes of the count: people must be sleeping, about to bed down or bedded down on the street, in doorways, parks, tents, bus shelters, cars, barns, sheds and other places not designed for habitation. Homeless people who are resident in hostels or shelters on the night in question are not counted. The count is not a precise science: bad weather can depress the figures; counters can miss rough sleepers if they are well hidden; regular sleepers may by chance spend the night elsewhere. Good housing support services, too, can have a positive effect in reducing the numbers.

As the main city within a large rural area, and one with good homelessness provision such as hostels, Cambridge has always acted as a magnet for rough sleepers. Relationship breakdown and substance abuse remain important triggers of homelessness. But increasingly other factors have come into play, not least poverty: the lack of affordable housing, high rents and unstable tenancies, housing benefit cuts, and precarious incomes caused by the rise of zero-hours working.

Exactly how bad the problem has got is a matter for debate. Between October and the end of November each year, every English local authority is required to submit snapshot estimates of the number of people sleeping out on a specified night.

Q10. The term 'rough sleeping', as used in this passage refers to

A. people roughing it out camping outdoors
B. people sleeping in homeless shelters
C. people sleeping in public spaces not earmarked for the purpose
D. homeless people sleeping uncomfortably after roughing others up

Q11. According to the author, all of the following are causes of rough sleeping except:

A. poor housing support services
B. revelling in the city centre in the evening
C. relationship breakdown and substance abuse
D. high rents and unstable tenancies

Q12. The scale of rough sleeping is difficult to capture because

A. the rate is increasing much faster outside London
B. rough sleepers insist on a degree of privacy
C. there are strict definitions of what constitutes a rough sleeper
D. weather conditions or hidden locations can skew the figures

Q13. This article primarily focuses on rough sleeping in the city of

A. London
B. Westminster
C. Cambridge
D. Birmingham

Q14. The most appropriate title for this article is

A. Counting Rough-sleepers in England's Homeless Hotspots
B. Be Respectful of Peoples' Bedrooms in England's Homeless Hotspots
C. The Scale of Rough Sleeping: Reasons and Solutions
D. An Analysis of Rough Sleeping: Towards a Solution

Q15. The organisers' warning to be respectful refers to

A. the services provided by parks, bus shelters, barns and sheds for the rough sleepers
B. the need for a degree of privacy for the rough sleepers
C. concern for relationship breakdowns and substance abuse among the rough sleepers
D. Deference for the brightly coloured sleeping bags owned by rough sleepers

Q.16– Q.20: LOGICAL REASONING

Q.16. A club with x members is organised into four committees according to the following rules:
(i) Each member belongs to exactly two committees.
(ii) Each pair of committees has exactly one member in common.Then

A. $x = 4$
B. $x = 6$
C. $x = 8$
D. x cannot be determined

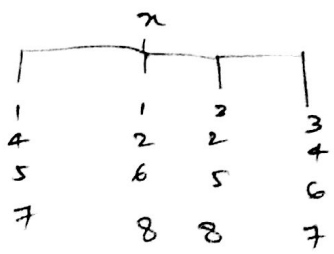
Q.17. Let P, Q, R and S be statements such that
(i) if both P and Q are true then R is false and
(ii) if P is false then S is false
Suppose R is true. Then which of the following necessarily holds?

A. Q is false
B. if S is false then Q is false
C. if S is true then Q is true
D. if S is true then Q is false

$P \wedge Q \rightarrow T \Rightarrow R - F$

$P \rightarrow F \Rightarrow S - F$

$R - T \Rightarrow P \wedge Q \not\rightarrow T$



Instructions for Questions 18 to 20: **Answer the questions based on the following information.**

Houses numbered 1 to 4 are situated east to west in that order. The houses are each occupied by professors of a college, namely, Prof.Sinha, Prof.Khanduja, Prof. Saxena and Prof.Kesarwani. They teach different languages: Urdu, Bengali, Gujarati and Sanskrit, and possess different makes of motorcycles each manufactured in a different year. Each of the professors teaches only one subject and owns only one motorcycle. The following additional information is available:

- The owner of the Suzuki motorcycle teaches Gujarati
- Prof. Anshul Sinha has a Honda motorcycle and teaches Urdu
- Prof.Khanduja, who teaches Gujarati, lives in house number 2
- Prof. Saxena teaches Sanskrit and lives in the western-most house
- 2001 model of motorcycle is owned by the professor of Urdu who lives in house number 1
- Prof.Kesarwani owns a BMW motorcycle

Q. 18. Which of the following statements is incorrect?

A. Prof.Kesarwani lives in house number 1
B. Prof. Sinha owns a 2001 model of motorcycle
C. Prof.Khanduja rides a Suzuki motorcycle
D. Prof.Khanduja has two neighbours

2001 - Sin - Urdu - Honda - 1
Khan - Guj - Suziki - 2
Sax - Sans - -4
Kes - Bengali - BMW - 3

Q. 19. From the above information we can infer that

A. Profs. Saxena and Khanduja are neighbours
B. Prof.Kesarwani teaches Bengali
C. Prof.Khanduja drives a 2001 model of motorcycle
D. Prof. Sinha drives a Suzuki motorcycle

Q. 20. Prof. Saxena drives motorcycle of the following make

A. Honda
B. BMW
C. Suzuki
D. none of the above

Sin	U
Sax	B
Khan	G – S
Kes	S

Q. 21 – Q. 25: DATA INTERPRETATION AND DATA VISUALIZATION

Instructions for Questions 21 to 25: **Answer the questions based on the following information.**

Table 1 gives the men's and women's world record times for various outdoor running distances, recognized by the International Association of Athletics Federations (IAAF) as of 17 November, 2017.

Table 1: World record running times data

Running distance (D) (meters (m))	Men's record (M) (seconds (s))	Women's record (W) (seconds (s))
100	9.6	10.5
200	19.2	21.3
400	43.0	47.6
800	101.0	113.3
1000	132.0	149.0
1500	206.0	230.1
2000	284.8	323.8
3000	440.7	486.1
5000	757.4	851.2
10000	1577.5	1757.5

Q.21. The average speeds (rounded to 2 places of decimal) for the men's and women's fastest 1500 metersrace have been, respectively,

A) 7.28 m/s and 6.52 m/s
B) 7.32 m/s and 6.52 m/s
C) 7.28 m/s and 6.48 m/s
D) 7.32 m/s and 6.48 m/s

Q.22. For which of the following categories, is the women's world record timeless than 110% of the men's world record time?

A) 800 meters B) 400 meters C) 200 meters D) 100 meters

Q.23. For which of the following categories is the ratio of thewomen's and men's record times, that is, W/M, the largest?

A) 100 meters B) 200 meters C) 800 meters D) 2000 meters

Q.24. The category in which the average speed is second highest is

A) Men's 100 meters
B) Men's 200 meters
C) Women's 100 meters
D) Women's 200 meters

Q.25. If α is the factor by which the women's world record average speed reduces with doubling of the running distance, the smallest value of α occurs for the pair of categories

A) (100 m, 200m)
B) (1500 m, 3000m)
C) (5000 m, 10000m)
D) (400 m, 800m)

Q.26–Q.50: QUANTITATIVE APTITUDE

In the following, $\mathbb{R}$ will denote the set of real numbers.

Q.26. Each student in a class of 40 plays at least one indoor game—chess, carom and scrabble. 18 play chess, 20 play scrabble and 27 play carom. 7 play both chess and scrabble, 12 play both scrabble and carom and 4 play all 3 games. The number of players who play chess and carom but not scrabble is

A) 10
B) 4
C) 6
D) 12

Q.27. The value of

$$^{20}C_1 + 2 \times {}^{20}C_2 + 3 \times {}^{20}C_3 + \cdots + 20 \times {}^{20}C_{20}$$

is

A) 19×20^{20}
B) 20×2^{19}
C) 20×2^{20}
D) 19×2^{19}

Q.28. The circle $x^2 + y^2 = 8$ intersects the parabola $y^2 = 2x$ at a point P in the first quadrant. The acute angle between the tangents to the circle and the parabola at the point P is

A) $\tan^{-1}(3)$
B) $\tan^{-1}(-3)$
C) $\tan^{-1}(\sqrt{3})$
D) $\tan^{-1}(-\sqrt{3})$

Q.29. In an isosceles right triangle PQR, $\angle PRQ = 90^\circ$. The points S and T are two trisection points of QR. The value of $\tan(\angle SPT)$ is

A) $\frac{3}{11}$
B) $\frac{1}{11}$
C) $\frac{2}{3}$
D) $\frac{1}{3}$

Q.30. Let $f : (0,\infty) \to (0,\infty)$ be a strictly decreasing function. Consider

$$h(x) = \frac{f\left(\frac{x}{1+x}\right)}{1+f\left(\frac{x}{1+x}\right)}.$$

Which one of the following is always true?

A) h is strictly decreasing
B) h is strictly increasing
C) h is strictly decreasing at first and then strictly increasing
D) h is strictly increasing at first and then strictly decreasing

Q.31. How many distinct 5×5 matrices are there such that each entry is either 0 or 1 and each row sum and each column sum is 4?

A) 64 B) 32 C) 120 D) 96

Q.32. The sum of an infinite geometric series of real numbers is 14, and the sum of the cubes of the terms of this series is 392. The first term of the series is

A) -14 B) 10 C) 7 D) -5

Q.33. The radius of the incircle of the triangle formed by the x-axisand the lines $3x + 4y - 24 = 0$, $3x - 4y + 24 = 0$is

A) $\frac{7}{3}$ B) $\frac{8}{3}$ C) 2 D) 3

Q.34. The expression

$$\tan^{-1}\left(\frac{1}{1+1\cdot 2}\right) + \tan^{-1}\left(\frac{1}{1+2\cdot 3}\right) + \tan^{-1}\left(\frac{1}{1+3\cdot 4}\right) + \cdots + \tan^{-1}\left(\frac{1}{1+n(n+1)}\right)$$

simplifies to

A) $\tan^{-1}(1) - \tan^{-1}(n+1)$ B) $\tan^{-1}(1) - \tan^{-1}(n)$
C) $\tan^{-1}(n) - \tan^{-1}(1)$ D) $\tan^{-1}(n+1) - \tan^{-1}(1)$

Q.35. Let $g(x) = f(x) + f(2+x)$, where

$$f(x) = \begin{cases} 1 - |x|, & |x| \le 1 \\ 0, & |x| > 1 \end{cases}$$

The number of points where the function g is not differentiable is

A) 4 B) 5 C) 6 D) 7

Q.36. If $A = \begin{pmatrix} 1 & 0 \\ -1 & 1 \end{pmatrix}$, then A^{50} is

A) $\begin{pmatrix} 50 & 0 \\ -1 & 1 \end{pmatrix}$ B) $\begin{pmatrix} 1 & 0 \\ -51 & 1 \end{pmatrix}$ C) $\begin{pmatrix} 1 & 0 \\ -50 & 1 \end{pmatrix}$ D) $\begin{pmatrix} 1 & 0 \\ -49 & 1 \end{pmatrix}$

Q.37. A curve is drawn such that the slope at any point $P = (x, y)$ is equal to x. The curve represents a family of

A) Circles
B) Parabolas
C) Ellipses
D) Hyperbolas

Q.38. Let f be a differentiable function on $[-2, 2]$ such that $f(-2) = 1, f(2) = 5$ and $\left|\frac{df(x)}{dx}\right| \leq 1$ for all $x \in [-2, 2]$. The value of $f(0)$ is

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

Q.39. For a set S, we denote by S', the complement of the set S. Let X, Y, Z be sets such that $Y \subseteq X$. Which of the following is always true?

A) $X \cap Z \subseteq Y \cap Z$
B) $Y' \cap Z' \supseteq X' \cap Z'$
C) $X \cap (Y \cup Z) = Y \cup (X \cap Z)$
D) $X' \cap Z \supseteq Y' \cap Z$

Q.40. A sequence $\{x_n\}$ of real numbers is defined as follows:

$$x_0 = 1, \quad x_1 = 2, \quad \text{and} \quad x_n = \frac{1 + x_{n-1}}{x_{n-2}} \text{ for } n = 2, 3, 4, \cdots$$

It follows that x_{2018} is

A) 1 B) 2 C) 3 D) 4

Q.41. The number of real roots of the equation

$$2 \sin\left(\frac{x^2 + x}{6}\right) = 2^x + 2^{-x}$$

is

A) 0 B) 1 C) 2 D) ∞

Q.42. The number of points where the function

$$f(x) = \begin{cases} (x+1)^4, & x \leq 1 \\ (x-5)^2, & x > 1 \end{cases}$$

attains its local maximum is

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

Q.43. A new sequence is obtained from the sequence of positive integers $\{1, 2, 3, \cdots\}$ by deleting all the perfect squares. The 2018^{th} term of the new sequence is

A) 2061 B) 2062 C) 2063 D) 2065

Q.44. Consider the function

$$f(x) = \frac{e^{-|x|}}{\max\{e^x, e^{-x}\}}, \qquad x \in \mathbb{R}.$$

It follows that

A) f is not continuous at some points
B) f is continuous everywhere, but not differentiable anywhere
C) f is continuous everywhere, but not differentiable at exactly one point
D) f is differentiable everywhere

Q.45. Let n be the number of ways in which 5 men and 6 women can stand in a queue such that all the women stand consecutively. Let m be the number of ways in which the same 11 persons can stand in a queue such that exactly 5 women stand consecutively. The value of $\frac{m}{n}$ is

A) 5 B) 6 C) $\frac{5}{6}$ D) $\frac{6}{5}$

Q.46. The locus of the centre of a circle that passes through the origin and cuts off a length $2a$ from the line $y = c$ is

A) $x^2 + 2cx = a^2 + c^2$
B) $x^2 + 2cy = a^2 + c^2$
C) $y^2 + 2cx = a^2 + c^2$
D) $y^2 + 2cy = a^2 + c^2$

Q.47. Consider the function $f(x) = [x + 1] - \sin\left(\frac{\pi}{2}[x]\right)$ for $x \in \mathbb{R}$, where $[x]$ denotes the greatest integer less than or equal to x. Let $l_1 = \lim_{x \to 0-} f(x)$ and $l_2 = \lim_{x \to 0+} f(x)$. It follows that

A) $l_1 = l_2 = 1$
B) $l_1 = l_2 = -1$
C) $l_1 = -1;\ l_2 = 1$
D) $l_1 = 1;\ l_2 = -1$

Q.48. Consider the following system of equations:

$$\begin{bmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \\ a & 9 & b & 10 \\ 6 & 8 & 10 & 13 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

The locus of all $(a, b) \in \mathbb{R}^2$ such that this system has at least two distinct solutions for (x_1, x_2, x_3, x_4) is

A) a parabola B) a straight line C) entire $\mathbb{R}^2$ D) a point

Q.49. The area bounded by the curve $y^2 = x^2 - x^4$ is

A) $\frac{4}{3}$ B) $\frac{2}{3}$ C) $\frac{3}{4}$ D) $\frac{3}{2}$

Q.50. The sum of the infinite series

$$\cot^{-1} 2 + \cot^{-1} 8 + \cot^{-1} 18 + \cot^{-1} 32 + \cot^{-1} 50 + \cdots$$

is

A) $\frac{\pi}{3}$ B) $\frac{\pi}{4}$ C) $\frac{\pi}{6}$ D) $\frac{\pi}{8}$

END OF THE QUESTION PAPER