



**PGDBA 2019**

All rights reserved. No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, or stored in any retrieval system of any nature without the permission of cracku.in, application for which shall be made to [support@cracku.in](mailto:support@cracku.in)

**Instructions**

Answer the questions based on the following information.

The following bar diagram represents the number of daily wages (in rupees) of 100 labourers in different wage classes on a construction site. Here the class interval a-b includes all wages (in rupees) greater than or equal to a and less than b except for the interval 360-400, where both the end points are included.

**No. of labourers**



**Question 1**

The number of labourers receiving at least 320 is:

- A 5
- B 15
- C 20
- D more than 20

**Answer: C**

**Explanation:**

Let's tabulate the information in the graph ,we get

Wages range	No of labourers
$\geq 200 - <240$	10
$\geq 240 - <280$	30
$\geq 280 - <320$	40
$\geq 320 - <360$	15
$\geq 360 - \leq 400$	5

From the table, it is evident that there are 20 members who got at least 320

Hence C is the correct answer.

**Question 2**

The number of labourers receiving less than Rs.250 is

- A less than 10

- B at least 10 but not more than 40
- C more than 40 but not more than 50
- D more than 50

**Answer: B**

**Explanation:**

Let's tabulate the information in the graph ,we get

Wages range	No of labourers
$\geq 200 - <240$	10
$\geq 240 - <280$	30
$\geq 280 - <320$	40
$\geq 320 - <360$	15
$\geq 360 - = <400$	5

No of labourers who receive wage less than 250 will be at least 10 but not more than 40 because all the people in the range 200-240 will be receiving wage less than 250.

So if all the people in the range  $\geq 240 - <280$  are included then to a maximum there will be 40 labourers to whom the wage will be less than 250.

Hence B is the correct answer.

**Question 3**

The maximum wage (in Rupees), such that at least 50% of the labourers definitely earn more than that, is

- A 240
- B 280
- C 290
- D 300

**Answer: B**

**Explanation:**

Let's tabulate the information in the graph ,we get

Wages range	No of labourers
$\geq 200 - <240$	10
$\geq 240 - <280$	30
$\geq 280 - <320$	40
$\geq 320 - <360$	15
$\geq 360 - = <400$	5

The total number of labourer = 100

50% of the total labourers is 50 who will fall in the range  $\geq 280 - <320$

∴ The maximum wage such that at least 50% of the labourers definitely earn more than that is 280

Hence B is the correct answer.

### Instructions

Answer the questions based on the following information.

The following table gives month-wise arrivals of foreign tourists in India in the years 2016 & 2017.

Table: Month-wise Arrivals of Foreign Tourists (in Thousands) in India (2016-2017)

Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2016	400	500	600	500	400	500	600	600	700	800	900	1000
2017	560	570	720	590	580	610	660	696	875	984	1170	1090

### Question 4

In which month of 2017 is the percentage increase over the corresponding month of the previous year the minimum?

- A FEB
- B JUL
- C SEP
- D DEC

Answer: D

Explanation:

Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2016	400	500	600	500	400	500	600	600	700	800	900	1000
2017	560	570	720	590	580	610	660	696	875	984	1170	1090

Let's solve the options one by one,

In 2017

Option A: The percentage increase of Foreign Tourists in FEB =  $\frac{570-500}{500} = 14\%$

Option B: The percentage increase of Foreign Tourists in JUL =  $\frac{660-600}{600} = 10\%$

Option C: The percentage increase of Foreign Tourists in SEP =  $\frac{875-700}{700} = 25\%$

Option D: The percentage increase of Foreign Tourists in DEC =  $\frac{1090-1000}{1000} = 9\%$

From the above values it is clear that the percentage increase of Foreign Tourists in DEC is minimum.

Hence D is the correct answer

### Question 5

In which month of 2017 is the percentage increase over the previous month the maximum?

- A MAR
- B SEP
- C OCT
- D NOV

Answer: A

Explanation:

Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2016	400	500	600	500	400	500	600	600	700	800	900	1000
2017	560	570	720	590	580	610	660	696	875	984	1170	1090

Let's solve the options one by one,

In 2017

Option A: The percentage increase of Foreign Tourists in MAR =  $\frac{720-570}{570} = 26.32\%$

Option B: The percentage increase of Foreign Tourists in SEP =  $\frac{875-696}{696} = 25.72\%$

Option C: The percentage increase of Foreign Tourists in OCT =  $\frac{984-875}{875} = 12.46\%$

Option D: The percentage increase of Foreign Tourists in NOV =  $\frac{1170-984}{984} = 18.90\%$

It is clear that the percentage increase of Foreign Tourists in MAR is maximum

Hence A is the correct answer.

### Instructions

For the following questions answer them individually

### Question 6

If  $f(x) = \log_e(9 - x^2)^{2-x}$ , then the domain of the function  $f$  is

A (-2, 3)

B (2, 3)

C  $(-2, 2) \cup (9, \infty)$

D  $(-3, 2) \cup (3, \infty)$

Answer: D

### Explanation:

Logarithmic function is defined only for positive values

So  $9 - x^2 > 0$  and  $9 - x^2$  is not equal to 0

$x \in (-3, 2) \cup (3, \infty)$

D is the correct answer.

### Question 7

If the system of linear equations

$$2x + y + 7z = a$$

$$6x - 2y + 11z = b$$

$$2x - y + 3z = c$$

has infinite number of solutions, then  $a, b, c$  must satisfy

A  $5a - 2b + c = 0$

B  $5a - b + c = 0$

C  $a - 5b + 2c = 0$

D  $a - 2b + 5c = 0$

Answer: D

### Explanation:

Let's represent the system of linear equations

$$2x + y + 7z = a$$

$$6x - 2y + 11z = b$$

$$2x - y + 3z = c$$
 in the Matrix Equation form

$$\begin{bmatrix} 2 & 1 & 7 & a \\ 6 & -2 & 11 & b \\ 2 & -1 & 3 & z \end{bmatrix}$$

Order of the matrix = 3

Now represent the matrix in echelon form

$$\begin{bmatrix} 2 & 1 & 7 & a \\ 0 & -5 & -10 & b - 3a \\ 0 & -2 & -4 & z - a \end{bmatrix}$$

$$\begin{bmatrix} 2 & 1 & 7 & a \\ 6 & -2 & 11 & b \\ 0 & 0 & 0 & 5z - 5a - 2b + 6a \end{bmatrix}$$

Rank of the matrix = No of Non-zero rows after transforming the matrix into echelon form

The system of linear equations will have infinite solutions only if Rank of the matrix is not equal to Order of the Matrix

$$\therefore 5z - 5a - 2b + 6a = 0$$

$$a - 2b + 5z = 0$$

D is the correct answer.

### Question 8

If  $\alpha, \beta$  are the roots of the equation  $x^2 + 3x - 3$ , then the value of  $(\alpha + 1)^{-1} + (\beta + 1)^{-1}$  is equal to

A  $\frac{2-2\sqrt{3}}{3}$

B  $\frac{2}{3}$

C  $\frac{\sqrt{21}}{5}$

D  $\frac{1}{5}$

Answer: D

### Explanation:

The sum of the roots  $\alpha + \beta = -\text{co efficient of } x / \text{co efficient of } x^2$

$$= -3$$

Product of the roots  $\alpha * \beta = \text{Constant} / \text{co efficient of } x^2$

$$= -3$$

$$(\alpha + 1)^{-1} + (\beta + 1)^{-1} = \alpha + \beta + 2 / \alpha * \beta + \alpha + \beta + 1$$

$$= 1/5$$

Hence D is the correct answer.

### Question 9

The number of real roots of the equation

$$(e^x + e^{-x})^3 + 3(e^x + e^{-x})^2 + 3(e^x + e^{-x}) = 7$$

- A 0
- B 1
- C 2
- D more than 2

**Answer: A**

**Explanation:**

Let  $e^x + e^{-x} = P$

$$P^3 + 3P^2 + 3P - 7 = 0$$

$$P - 1 (P^2 + 4P + 7) = 0$$

$P = 1$  and the other two roots are imaginary roots

$e^x + e^{-x} = 1$  but the minimum value of  $e^x + e^{-x}$  is 2

No of real roots is 0.

Hence A is the correct answer.

**Question 10**

Let  $x = -\frac{1}{1!} \cdot \frac{3}{4} + \frac{1}{2!} \cdot \left(\frac{3}{4}\right)^2 - \frac{1}{3!} \cdot \left(\frac{3}{4}\right)^3 + \dots$  and  $y = x - \frac{x^2}{2} + \frac{x^3}{3} - \dots$  then the value of  $y$  is

- A  $-\frac{3}{4}$
- B  $\frac{3}{4}$
- C  $-\frac{4}{3}$
- D  $\frac{4}{3}$

**Answer: A**

**Explanation:**

$$\log(1 - x) =$$

$$-x - \frac{1}{2}x^2 - \frac{1}{3}x^3 - \frac{1}{4}x^4 - \dots$$

$$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!} = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$$

$$\therefore y = \log(1 + x)$$

$$x = -\frac{1}{1!} \cdot \frac{3}{4} + \frac{1}{2!} \cdot \left(\frac{3}{4}\right)^2 - \frac{1}{3!} \cdot \left(\frac{3}{4}\right)^3 + \dots$$

$$= e^{-\frac{3}{4}} - 1$$

$$\therefore y = \log(e^{-\frac{3}{4}})$$

$$= -\frac{3}{4}$$

Hence A is the correct answer.

**Question 11**

If  $P, Q, R$  are subsets of some universal set, then the conditions  $P^c \cap Q \subseteq R^c \cap Q$  and  $P^c \cap Q^c \subseteq R^c \cap Q^c$  imply

- A  $R \subseteq P$
- B  $P \subseteq R$

C  $Q = R$

D  $P = Q$

Answer: E

**Question 12**

The sides of triangle are 3 consecutive even integers with the largest side being less than 13. What is the total number of such triangles?

A 1

B 2

C 3

D 4

Answer: E

**Explanation:**

We have 4 cases

1: Largest side = 12 then Sides of the triangle are 8,10,12

2: Largest side = 10 then Sides of the triangle are 10,8,6

3: Largest side = 8 then Sides of the triangle are 8,6,4

4: Largest side = 6 then Sides of the triangle are 6,4,2

According to the properties of the triangle,

Sum of any two sides of a triangle is greater than the third side and difference of any two sides of a triangle is lesser than the third side

All the above cases satisfy the properties of the triangle except case 4

Hence C is the correct answer.

**Question 13**

The circle  $x^2 + y^2 = 9$  intersects with the parabola  $y^2 = 8x$  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  $\tan^{-1}(2\sqrt{2})$

B  $\tan^{-1}(\sqrt{2})$

C  $\tan^{-1}(\sqrt{2})$

D  $\tan^{-1}(2\sqrt{2})$

Answer: C

**Explanation:**

Let's find the point of intersection of the circle  $x^2 + y^2 = 9$  and the parabola  $y^2 = 8x$

$$x^2 + 8x = 9$$

On solving the equation we will get the values of x as 1,-9

Since the angle between the tangents has to be found in the first Quadrant, value of x is 1

$$\therefore \text{value of } y = 2\sqrt{2}$$

Let's find the slope of the tangent to the circle and the parabola

On differentiating the equation of the circle, we get

$$2x + 2y \frac{dy}{dx} = 0$$



Let  $\sqrt{32\sqrt{32\sqrt{32\sqrt{32\cdots}}}} = x$

$$\sqrt{32x} = x$$

Squaring on both sides , we get

$$32x = x^2$$

$$\therefore x = 32$$

Hence B is the correct answer.

#### Question 16

The total number of onto functions from  $\{1,2,\dots,10\}$  to  $\{1,2,\dots,9\}$  is

A  ${}^{10}C_2 \times 9!$

B  ${}^{10}P_2 \times 9!$

C  $9 \times 10!$

D  $10^9$

Answer: A

#### Explanation:

The number of elements in set A = 10

The number of elements in set B = 9

for the mapping to be onto there will be a element in set B which has 2 pre-images from set A.

Two elements can be selected in  ${}^{10}C_2$  ways and the elements in set B can be arranged in  $9!$  ways

$$\therefore \text{No. of onto functions} = {}^{10}C_2 \times 9!$$

A is the correct answer

#### Question 17

All words formed by permutations of the word 'WARE' are arranged in a list according to the dictionary ordering. The position of the word 'WEAR' in this list is at number

A 20

B 21

C 22

D 23

Answer: B

#### Explanation:

All the words starting with the letter A =3!

All the words starting with the letter E =3!

All the words starting with the letter R =3!

All the words starting with the letter WA =2!

All the words starting with the letter WEAR =1

$$\therefore \text{position of the word 'WEAR' in this list is at number } 3!*3 + 2+1$$

$$=21$$

Hence B is the correct answer.

**Question 18**

The number of integers between 300 and 1100 which are divisible by either 7 or 13 but not both is

- A 149
- B 158
- C 167
- D 176

**Answer: B**

**Explanation:**

Multiples of 7 are {301,308 .....1099}  $n=115$

Multiples of 13 are {312,323,.....1092}  $n = 61$

Multiples of 91 are {364,455.....1092}  $n= 9$

Number of integers which are divisible by either 7 or 13 but not both is  $115+61-2*9$   
 $=158$

Hence B is the correct answer.

**Question 19**

The diameter of the circumcircle of the triangle formed by the line  $24x + 7y = 168$  and the coordinate axes is

- A  $15\sqrt{2}$
- B 24
- C 25
- D  $12\sqrt{3}$

**Answer: C**

**Explanation:**

Let's rewrite the equation  $24x + 7y = 168$  in intercept form

$$\frac{x}{7} + \frac{y}{24} = 1$$

$\therefore$  The co-ordinates of the triangle are  $(7,0),(0,0),(0,24)$

Diameter of the circumcircle formed by the vertices is given by

Distance between the co-ordinates  $(7,0)$  and  $(0,24) = \sqrt{7^2 + 24^2}$   
 $=25$

Hence C is the correct answer.

**Question 20**

Let  $f : R \rightarrow R$  be an even function that is differentiable every where except exactly at 10 distinct points. Then which of the following statements is TRUE?

- A  $f'(0)$  does not exist
- B  $f'(0) > 0$
- C  $f'(0) = 0$
- D  $f'(0) < 0$

Answer: E

Question 21

Let the function  $f$  be defined on the set of real numbers by

$$f(x) = \begin{cases} x^2 - x, & \text{if } x < 1 \\ \frac{x^2 - 1}{3}, & \text{if } x \geq 1 \end{cases} \text{ then which of the following statement is TRUE?}$$

- A  $f$  is decreasing for  $x < 1$  and increasing for  $x \geq 1$
- B  $f$  is not continuous at  $x = 1$
- C  $f$  is continuous but not differentiable at  $x = 1$
- D  $f$  is differentiable at  $x = 1$

Answer: E

Question 22

If  $f'(x)$  and  $g'(x)$  exist for all  $x \in R$ , and if  $f'(x) > g'(x)$  for all  $x \in R$ , then the curve  $y = f(x)$  and  $y = g(x)$  in the  $xy$ -plane

- A intersect exactly once
- B intersect at most once
- C cannot intersect
- D could intersect more than once

Answer: C

Explanation:

$$f'(x) > g'(x) \text{ for all } x \in R$$

On integrating, we get

$$f(x) > g(x) \text{ for all values of } x \text{ in } R$$

Hence they will not intersect each other.

Question 23

The value of the integral  $\int_{-\frac{1}{\sqrt{3}}}^{\frac{1}{\sqrt{3}}} \left( \frac{x^2 - \tan x}{1+x^2} \right) dx$  is equal to

- A  $2\left(\frac{1}{\sqrt{3}} - \frac{\pi}{6}\right)$
- B  $2\left(\frac{1}{\sqrt{3}} + \frac{\pi}{6}\right)$
- C  $\frac{2\pi}{3}$
- D  $2\left(\sqrt{3} - \frac{\pi}{6}\right)$

Answer: A

Explanation:

$$\int_{-\frac{1}{\sqrt{3}}}^{\frac{1}{\sqrt{3}}} \left( \frac{x^2 - \tan x}{1+x^2} \right) dx$$

$$= \int_{-1/\sqrt{3}}^{1/\sqrt{3}} \frac{x^2+1-1-\tan x}{1+x^2} dx$$

$$= \int_{-1/\sqrt{3}}^{1/\sqrt{3}} \frac{x^2+1-1-\tan x}{1+x^2} dx$$

$$= \int_{-1/\sqrt{3}}^{1/\sqrt{3}} 1 - \frac{1}{1+x^2} + \frac{1/\sqrt{3} \tan x}{1+x^2}$$

$$= x - \tan^{-1} x - \frac{\tan x}{2} \quad [\because$$

$$\int \frac{1}{1+x^2} dx = \tan^{-1} x]$$

$$\int x^n dx = \frac{x^{n+1}}{n+1}$$

$$= \frac{1}{\sqrt{3}} - \frac{\pi}{6} - \frac{\tan^2 \sqrt{3}}{2} - \frac{1}{\sqrt{3}} - \frac{-\pi i}{6} - \frac{\tan^2 \sqrt{3}}{2}$$

$$= 2\left(\frac{1}{\sqrt{3}} - \frac{\pi}{6}\right)$$

Hence A is the correct answer.

### Question 24

The area enclosed between the parabolas  $y^2 = 16(1+x)$  and  $y^2 = 16(1-x)$  is

A  $\frac{8}{3}$

B  $\frac{16}{3}$

C  $\frac{32}{3}$

D  $\frac{64}{3}$

Answer: C

### Explanation:

$$y^2 = 16(1+x) \text{ and } y^2 = 16(1-x)$$

Equating the parabolas, we will get the point of intersection of both

$$16(1+x) = 16(1-x)$$

$$x=0$$

Substitute the value of x in the parabola  $y^2 = 16(1+x)$

$$y = \pm 4$$

Point of intersection = (0,4),(0,-4)

$$= 2 \left( \int_{-4}^4 \left( \frac{y^2-16}{16} \right) - \left( \frac{16-y^2}{16} \right) \right) dy$$

$$= 2 \left( \int_0^4 \left( \frac{y^2-16}{16} \right) - \left( \frac{16-y^2}{16} \right) \right) dy$$

$$[\because \int_0^{2a} F(x) dx = 2 \left( \int_0^a F(x) dx \right)]$$

$$= 2 \left( \int_0^4 \left( \frac{y^2}{16} \right) - 1 - 1 + \left( \frac{y^2}{16} \right) \right)$$

$$= 2 \left( \int_0^4 \left( \frac{y^2}{8} \right) - 2 \right)$$

$$= 2 \left( \frac{y^3}{3 \cdot 8} - 2y \right) \text{ y varies from 0-4}$$

$$= 2 \left( \frac{8}{3} - 8 \right)$$

$$= 2 \left( \frac{16}{3} \right) \quad (\because \text{Area cant be negative})$$

Hence C is the correct answer

Question 25

Let  $[x]$  denote the greatest integer less than or equal to  $x$ . The value of the integral  $\int_0^{\sqrt{2}} [x^2]e^x dx$  is equal to

- A 0
- B  $\sqrt{2}e - 1$
- C  $e^{\sqrt{2}} - e$
- D  $e^2 - e$

Answer: C

Explanation:

$$\begin{aligned} &= \int_0^1 0e^x dx + \int_1^{\sqrt{2}} 1e^x dx \\ &= 0 + e^x \Big|_1^{\sqrt{2}} - 1 \\ &= e^{\sqrt{2}} - e^1 \end{aligned}$$

Hence C is the correct answer.

Question 26

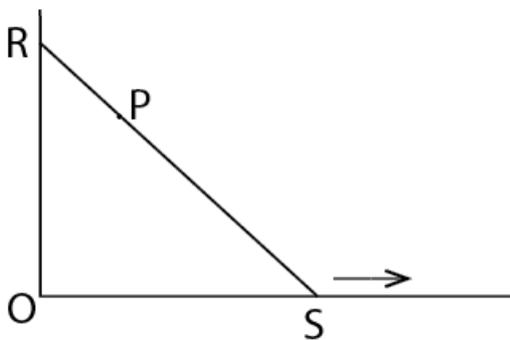
A function  $f(x) = ax^2 + bx + c$ , where  $a, b, c \in R$ , satisfies the property  $f(x) < x$  for all  $x \in R$ . Then which of the following statements must always be TRUE ?

- A  $a \leq 0$
- B  $b \geq 1$
- C  $c = 0$
- D  $b > 1$

Answer: E

Question 27

The foot of the ladder RS in the following figure is slipping away from the wall RO.



Then the point P(a fixed point on the ladder) lies on

- A a straight line
- B a parabola
- C a hyperbola

D an ellipse

Answer: E

### Question 28

Given that

$$\lim_{x \rightarrow 0} \frac{ae^x - be^{-x}}{x + \sin x} = 1$$

Then the value of  $ab$  is

A 0

B  $\frac{1}{6}$

C  $\frac{1}{4}$

D 1

Answer: D

Explanation:

Since the expression  $\lim_{x \rightarrow 0} \frac{ae^x - be^{-x}}{x + \sin x}$  is in  $0/0$  form

L'Hospital's rule can be applied

$$\lim_{x \rightarrow 0} \frac{ae^x + be^{-x}}{1 + \cos x} = 1$$

$$\frac{a+b}{2} = 1 \text{ which is valid only when } a = b = 1$$

$$\therefore ab = 1$$

Hence D is the correct answer.

### Question 29

If  $\left| \frac{x+1}{x-1} \right| > \frac{x+1}{x-1}$ , then

A  $-1 \leq x \leq -1$

B  $-1 < x < 1$

C  $x > 1$

D  $x < -1$

Answer: B

Explanation:

$\left| \frac{x+1}{x-1} \right| > \frac{x+1}{x-1}$  will be greater than  $\frac{x+1}{x-1}$  only if  $\frac{x+1}{x-1} < 0$

$$\therefore x \in (-1, 1)$$

Hence B is the correct answer.

### Question 30

How many  $6 \times 7$  matrices are there with entries in  $\{0,1\}$  such that all the row totals and column totals are odd numbers?

A  $\frac{2^{42}}{2}$

B  $\frac{42^2}{2}$

C 42

D 0

Answer: E

## Reasoning

### Instructions

Read the paragraph below and answer these questions.

Five analysts, P, Q, R, S and T each own at least one mobile phone handset. Among the five of them, they own 1 Nokia, 2 Samsung, 3 One Plus, 3 iPhone, and 1 Motorola brand handsets use the following information to answer Questions

- The analyst who owns the Nokia handset does not own any other handset.
- Q owns handsets of three different brands.
- The number of handsets owned by S is double of the number of handsets owned by T.
- There is at least one brand whose handset is owned by both R and T.
- No brand is owned by more than two analysts.

### Question 31

What the number of handsets owned by T?

A 1

B 2

C 3

D 4

Answer: A

### Explanation:

Let's tabulate the conditions one by one.

Since we have ten handsets, we have two cases

1: T owns 2 handsets

2: T owns 1 handset

Case 1 :

If T owns 2 handsets, then S owns 4 handsets

But Q owns handsets of three different brands.

So we are left with only 1 handset to be given between P and R.

This case will not serve the purpose

Case 2: T owns 1 handset.

If T owns 1 handset, then S owns 2 handsets

Since the person who owns Nokia does not own any other handsets

It cannot be T as T and R have at least one handset brand in common

It cannot be Q as it owns three different brands.

It cannot be S as it has 2 handsets and the person who owns Nokia doesn't own any other handsets.

So it has to be P : P owns a Nokia handset.

P	Nokia
Q	3 brands
R	At least one handset in common with T
S	2 handsets
T	1 handset

It is clear from the table that T owns 1 handset.

Hence option A is the correct answer.

**Question 32**

**Who owns the Nokia handset?**

- A P
- B R
- C S
- D T

**Answer: A**

**Explanation:**

Let's tabulate the conditions one by one.

Since we have ten handsets, we have two cases

- 1: T owns 2 handsets
- 2: T owns 1 handset

Case 1 :

If T owns 2 handsets, then S owns 4 handsets  
 But Q owns handsets of three different brands.  
 So we are left with only 1 handset to be given between P and R.  
 This case will not serve the purpose

Case 2: T owns 1 handset.

If T owns 1 handset, then S owns 2 handsets  
 Since the person who owns Nokia does not own any other handsets  
 It cannot be T as T and R have at least one handset brand in common  
 It cannot be Q as it owns three different brands.  
 It cannot be S as it has 2 handsets and the person who owns Nokia doesn't own any other handsets.  
 So it has to be P : P owns a Nokia handset.

P	Nokia
Q	3 brands
R	At least one handset in common with T
S	2 handsets
T	1 handset

Hence option A is the correct answer.

**Question 33**

**If R owns only one handset, which brand it has to be?**

- A Nokia
- B Samsung
- C iPhone
- D onePlus

**Answer: B**

**Explanation:**

Let's tabulate the conditions one by one.

Since we have ten handsets, we have two cases

1: T owns 2 handsets

2: T owns 1 handset

Case 1 :

If T owns 2 handsets, then S owns 4 handsets

But Q owns handsets of three different brands.

So we are left with only 1 handset to be given between P and R.

This case will not serve the purpose

Case 2: T owns 1 handset.

If T owns 1 handset, then S owns 2 handsets

Since the person who owns Nokia does not own any other handsets

It cannot be T as T and R have at least one handset brand in common

It cannot be Q as it owns three different brands.

It cannot be S as it has 2 handsets and the person who owns Nokia doesn't own any other handsets.

So it has to be P : P owns a Nokia handset.

P	Nokia
Q	3 brands
R	At least one handset in common with T
S	2 handsets
T	1 handset

Since R must own a handset in common with T and it owns only a single handset and a handset brand can be owned by a maximum of 2 people .

R and T must own Samsung brand handset

Hence B is the correct answer.

**Question 34**

**If R owns two handsets, which of the following combinations cannot be owned by R?**

- A Samsung and One Plus
- B iPhone and Samsung
- C One Plus and Motorola
- D None of the above

**Answer: E**

**Explanation:**

Let's tabulate the conditions one by one.

Since we have ten handsets, we have two cases

1: T owns 2 handsets

2: T owns 1 handset

Case 1 :

If T owns 2 handsets, then S owns 4 handsets

But Q owns handsets of three different brands.

So we are left with only 1 handset to be given between P and R.

This case will not serve the purpose

Case 2: T owns 1 handset.

If T owns 1 handset, then S owns 2 handsets

Since the person who owns Nokia does not own any other handsets

It cannot be T as T and R have at least one handset brand in common

It cannot be Q as it owns three different brands.

It cannot be S as it has 2 handsets and the person who owns Nokia doesn't own any other handsets.

So it has to be P : P owns a Nokia handset.

P	Nokia
Q	3 brands
R	At least one handset in common with T
S	2 handsets
T	1 handset

Let's consider the options one by one,

Option A: If R owns handsets of Samsung and One Plus then T can own Samsung ,Q can own Motorola ,Iphone ,One Plus , S can own Iphone brand handsets. So this combination is possible.

Option B: If R owns handsets of Samsung and Iphone then T can own Samsung ,Q can own Motorola ,Iphone ,One Plus , S can own One Plus brand handsets. So this combination is possible.

Option C: If R owns handsets of One Plus and Motorola then T can own One Plus.We are left with only two brands but Q has handsets of 3 different brands. So this combination is not possible.

Hence C is the correct answer.

**Question 35**

**If Q and S have at least two brands in common, then what is the maximum number of handsets that Q and S together can own?**

A 5

B 6

C 7

D 8

**Answer: C**

**Explanation:**

Let's tabulate the conditions one by one.

Since we have ten handsets, we have two cases

1: T owns 2 handsets

2: T owns 1 handset

Case 1 :

If T owns 2 handsets, then S owns 4 handsets

But Q owns handsets of three different brands.

So we are left with only 1 handset to be given between P and R.

This case will not serve the purpose

Case 2: T owns 1 handset.

If T owns 1 handset, then S owns 2 handsets

Since the person who owns Nokia does not own any other handsets

It cannot be T as T and R have at least one handset brand in common

It cannot be Q as it owns three different brands.

It cannot be S as it has 2 handsets and the person who owns Nokia doesn't own any other handsets.

So it has to be P : P owns a Nokia handset.

P	Nokia
Q	3 brands
R	At least one handset in common with T
S	2 handsets
T	1 handset

Since we have to maximise the number of handsets with Q and S together ,R and T owns 1 handset each i.e Samsung .

S owns 2 handsets of either Iphone or One plus ,Q owns 4 handsets

So maximum number of handsets that Q and S together can own is 7

Hence C is the correct answer

## English

### Instructions

For the following questions answer them individually

### Question 36

Each of the following four sentences has two words within brackets. The word which has been highlighted has been used as the most appropriate word for the sentence. In one of the sentences, the wrong word has been highlighted. Identify that sentence and indicate that option as your answer.

- A It is a nightmare driving in this city during ( **peak**, peek) traffic hours.
- B You need to (ensure, **insure**) your belongings against theft and fire.
- C He distributed the document so as to (illicit, **elicit**) everyone's opinion.
- D You must understand the underlying (principle, **principal**) to prove the theorem .

**Answer:** D

### Explanation:

Let's have a look at the meanings of each of the words

Peak : The pointed top of a mountain or the point of highest activity, quality, or achievement.

Peek: Look quickly or furtively.

Peak traffic hours means rush hours. Hence this is used correctly in the given context

Ensure : Make sure that (something) will occur or be the case

Insure: Arrange for compensation in the event of damage to or loss of (property)

Insure means arrange for compensation in the event of theft. Hence this is used correctly in the given context

Illicit: Forbidden by law, rules, or custom

Elicit: Evoke or draw out (a reaction, answer, or fact) from someone.

Elicit means draw out or to take opinion from someone. Hence this is used correctly in the given context

Principal: First in order of importance; main.

Principle: A rule or belief governing one's behaviour

Principal means main or important is misused in the given context.

Hence D is the correct answer.

### Question 37

Each of the following four sentences has two words within brackets. The word which has been highlighted has been used as the most appropriate word for the sentence. In one of the sentences, the wrong word has been highlighted. Identify that sentence and indicate that option

- A She was (complimented, **complimented**) for her excellent presentation.
- B Under his strict but (beneficent, **beneficial**) rule, the empire enjoyed a period of peace.
- C Due to his poor (**oversight**, oversight) during construction, the building had many flaws.
- D Since he took unauthorized leave, there was a (**break**, brake) in his service.

Answer: B

### Explanation:

Let's have a look at the meanings of each of the words.

Complimented: A thing that contributes extra features to something else in such a way as to improve or emphasize its quality.

Complimented: A polite expression of praise or admiration

A compliment which means a polite expression of praise is used correctly in the sentence.

Beneficent: (of a person) generous or doing good.

Beneficial: Resulting in good; favourable or advantageous

A rule can be beneficent. Hence beneficial was misused in the sentence.

Oversight: An unintentional failure to notice or do something.

Oversite: A layer of concrete used to seal the earth under the ground floor of a house

An oversight which means failure to notice is used correctly in the sentence

Break: Fail to continue with

Brake: A device for slowing or stopping a moving vehicle

A break which means failure to continue is used correctly in the sentence.

Hence B is the correct answer.

### Question 38

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 option.

(i) But state efforts to build up the data sector in rural areas have resulted in a plethora of under-used sites.

(ii) At the same time, data centres in main cities are already running at capacity. In Beijing and Shanghai, demand outstrips supply by 20 and 25 per cent, respectively, according to the ministry.

(iii) There are twice as many data centres in north-eastern China than required, according to figures from China's Ministry of Industry and Information Technology.

(iv) Tech groups have been given incentives by Chinese regulators to set up their onshore data storage in poorer, more remote areas, with inducements such as free land and cheap power.

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

Answer: A

**Explanation:**

After going through the sentence, we can understand that the paragraph talks about setting up data centres in China.

Sentence 4 which talks about setting up data centres in poorer remote areas sets up the context Hence this can be the opening sentence.

Sentence 1 which refutes the sentence 4 can be its continuation.

Sentence 1 and 3 are pairs as they talk about the data centres in main cities.

Sentence 2 talks about the number of data centres in China concludes the paragraph.

Hence the correct sequence is 4132.

A is the correct answer.

**Question 39**

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) For almost a billion years, while its core churned and produced a protective magnetic field, Mars may have been among the friendlier places for life as we know it to set up and flourish.

(ii) But that is what the \$2.4-billion 2020 rover will attempt to do.

(iii) Though Mars is a parched, toxic desert today, the planet was once much warmer and covered in liquid seas.

(iv) The trouble is, finding evidence for past life on an alien world, especially if that extinct life is microscopic, is not exactly easy.

A (i), (ii), (iii), (iv)

B (iv), (ii), (i), (iii)

C (i), (iii), (iv), (ii)

D (iii), (i), (iv), (ii)

**Answer: D**

**Explanation:**

After going through the sentences, we can understand that the paragraph talks about life on the planet Mars.

Sentence 3 introduces the topic as it talks about Mars and its qualities.

3 and 1 are pairs as sentence 1 further talks about Mars and how it has been among friendlier places to live.

Sentence 4 which furthers the discussion by stating the difficulty in tracing the past evidence.

Sentence 2 concludes talking about how 2020 rover will attempt to do.

The sequence is 3142.

D is the correct answer.

**Question 40**

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) Part of the rapid slowing reflected specific problems in the German car industry, where changes in emissions regulation have had a one-off impact on production.

(ii) But even without that, growth would barely have been positive.

(iii) Last week it was revealed that Germany, one of the few reliable engines of eurozone growth since the global financial crisis, had seen a 0.2 per cent fall in GDP in the third quarter.

(iv) Moreover, indicators of business sentiment show that underlying growth momentum has slowed across the eurozone.

A (i), (ii), (iv), (iii)

B (iii), (i), (ii), (iv)

C (i), (iv), (iii), (ii)

D (iii), (i), (iv), (ii)

**Answer: B**

**Explanation:**

After going through the sentences, we can understand that the paragraph talks about the financial crisis in Germany.

Sentence 3 introduces the topic by stating a 0.2 per cent fall in GDP.  
Sentence 1 will follow it as it explains the reasons for the downfall.  
Sentence 2 refutes the explanation in sentence 1.  
Sentence 4 furthers the discussion by indicators of business sentiment which slowed the growth across the eurozone.  
3124 is the correct sequence.

B is the correct answer.

### Instructions

Read the passage below and choose the most appropriate answer for the questions that follow.

Passage I

One pictured a woman holding an hourglass next to the words: "Beauty has no age limit. Fertility does." Another portrayed a pair of baby shoes wrapped in a ribbon of the Italian flag. Yet another showed a man holding a half-burned cigarette: "Don't let your sperm go up in smoke" it read.

Were they part of a government effort to promote "Fertility Day" on Sept. 22? A campaign intended to encourage Italians to have more babies. Instead, the ads set off a furore were denounced as being offensive, and within days were withdrawn. What they did succeed in doing, however, was to ignite a deeper and lasting debate about why it is that Italy has one of the lowest birthrates in the world, and what can be done about it.

The problem is not a lack of desire to have children, critics of the campaign say, but rather the lack of meaningful support provided by the government and many employers in a country where the family remains the primary source of child care. Many working women, without an extended family to care for a child, face a dilemma, as private child care is expensive. Some also worry that their job security may be undermined by missing workdays because of child care issues. Many companies do not offer flexible hours for working mothers.

Not surprisingly, Italy's long slowdown in childbirth has coincided with its recent economic slump. But Italian families have been shrinking for decades. In 2015, 488,000 babies were born in Italy, the fewest since the country first unified in 1861. It has one of the lowest birthrates in Europe, with 1.37 children per woman, compared with a European average of 1.6, according to Eurostat figures. By contrast, in France, the economy has been flat, too, but a family-oriented system provides a far more generous social safety net that includes daycare and subsidies for families to have children. There, women have two children each on average.

The Ministry of Health began the fertility campaign on Aug. 31 with a group of online advertisements and a hashtag on Twitter. The goal was to publicize a series of public meetings on Fertility Day and encourage Italians to have more children. Even Prime Minister Matteo Renzi, whose own health minister started the campaign distanced himself from the ads in a radio interview. Under Mr Renzi, Italy's government has paid families with a so-called baby bonus of 80 to 160 euros, or about \$90 to \$180, for low- and middle-income households. And it has approved labour laws giving more flexibility on parental leave.

But Italy allocates only 1 per cent of its gross domestic product to social protection benefits — half the European average. One child out of three here is at risk of relative poverty. Italy's health minister, Beatrice Lorenzin, responding on Facebook, wrote that the Fertility Day, the campaign was not a "call to reproduction" but a day to discuss "the fertility issues that 15 per cent of Italians deal with." She promptly cancelled the campaign. "I am saddened that the launch of the advertising campaign misled many people," Ms. Lorenzine said. "I withdrew it to change it."

### Question 41

Which one of the following sentences is inaccurate based on all the facts detailed in the passage?

- A A sizable proportion of Italian children are facing poor economic condition.
- B The ad campaign was launched nationwide across television networks.
- C On average, a group of twenty-seven women give birth to thirty-seven children in Italy as opposed to fifty-four children in France.
- D Prime Minister Renzi has taken several steps in the right direction to address the core, the problem discussed here.

Answer: B

### Explanation:

Option A can be inferred from the fifth para, where the author has mentioned that Italy allocates only 1 per cent of its gross domestic product to social protection benefits — half the European average. One child out of three here is at risk of relative poverty  
Option C can be inferred from the fourth para where the author has mentioned birth rates of Italy and France to be 1.37 and 2 respectively.

Option D can be inferred from the penultimate para where Prime Minister Matteo Renzi, whose own health minister started the campaign distanced himself from the ads in a radio interview. Under Mr Renzi, Italy's government has paid families with a so-called

baby bonus of 80 to 160 euros, or about \$90 to \$180, for low- and middle-income households. and it has approved labour laws giving more flexibility on parental leave

Option B cannot be inferred as the ad campaign was launched with a group of online advertisements and a hashtag on Twitter.

Hence B is the correct answer.

#### Question 42

According to the passage, what is the key reason for Italy's low fertility rate?

- A Couples are choosing to remain childless so that they focus on their career in an extremely competitive environment.
- B A reduction in overall wage rate across the country since the recent economic recession.
- C Absence of a support system for families with children.
- D High prevalence of smoking among men and women in the country.

Answer: C

#### Explanation:

In the fourth paragraph, the author emphasized a family-oriented system provides a far more generous social safety net that includes daycare and subsidies for families to have children which were existing in France where the fertility rate is 2 whereas it lacks in Italy's economy which has the lowest fertility rate of 1.37. Hence the absence of a support system for families with children is the key reason for Italy's low fertility rate.

C is the correct answer.

#### Question 43

Which of the following words best captures Prime Minister Matteo Renzi's reaction to the fertility campaign?

- A Disassociation
- B Belligerence
- C Indifference
- D Solidarity

Answer: A

#### Explanation:

Disassociation which means to separate or to detach. In the penultimate paragraph, the author has mentioned Prime Minister Matteo Renzi whose own health minister started the campaign distanced himself from the ads in a radio interview. Hence disassociation which means the state of being disconnected would be the Prime Minister Matteo Renzi's reaction to the fertility campaign.

Belligerence which means hostile and aggressive. Prime Minister Matteo Renzi was nowhere offensive to the fertility campaign.

Indifference which means lack of concern. We can infer that Prime Minister Matteo Renzi was not indifferent as during his rule Italy's government has paid families with a so-called baby bonus of 80 to 160 euros, or about \$90 to \$180, for low- and middle-income households. And it has approved labour laws giving more flexibility on parental leave.

Solidarity which means mutual support within a group. No wherein the passage the author has mentioned support among the group.

Hence A is the correct answer.

#### Question 44

Based on the passage, which of the following measures will not have a meaningful impact on Italy's fertility rate even if the government worked hard to implement them?

- A Making it mandatory for all private companies to allow flexible working hours to pregnant women and new moms.
- B Investing in a robust public child care system.
- C Persuading low income families to have children by providing them financial incentives.

D Spending money on advertisements that encourage Italians to have more children.

**Answer: D**

**Explanation:**

Option A: In the third paragraph, the author has mentioned "Many companies do not offer flexible hours for working mothers".as one of the reasons why Italy has the lowest birthrate. So if all private companies to allow flexible working hours to pregnant women and new moms this will have a meaningful impact on Italy's fertility rate

Option B: In the fourth paragraph the author emphasised the role of a family-oriented system provides a far more generous social safety net that includes daycare and subsidies for families to have children.Hence this will have a meaningful impact on Italy's fertility rate

Option C: In the third paragraph, the author has mentioned "Many working women, without an extended family to care for a child, face a dilemma, as private child care is expensive. Some also worry that their job security may be undermined by missing workdays because of childcare issues".Hence this will have a meaningful impact on Italy's fertility rate

Option D:In the third paragraph, the author has mentioned "It is not a lack of desire to have children , but the lack of significant support provided by the government and many employers in a country where the family remains the primary source of child care is the reasons why Italy has the lowest birthrate .So Spending money on advertisements that encourage Italians to have more children will not have a meaningful impact on Italy's fertility rate even if the government works hard to implement them

D is the correct answer.

**Question 45**

**The passage mentions that the idea of "Fertility Day" was "denounced as being offensive" According to the campaign. what exactly did the Italians find "offensive"?**

A The message being conveyed was not appropriate for young children who also saw These advertisements.

B The campaign offended the religious sensibilities of many Italians.

C The government failed to recognize the real cause of the low fertility issue.

D The advertisements offended men as it linked smoking with low fertility rates.

**Answer: C**

**Explanation:**

In paragraph three, the author has mentioned that the problem is not a lack of desire to have children, critics of the campaign say, but rather the lack of meaningful support provided by the government and many employers in a country where the family remains the primary source of child care. Many working women, without an extended family to care for a child, face a dilemma, as private child care is expensive. Some also worry that their job security may be undermined by missing workdays because of child care issues. Many companies do not offer flexible hours for working mothers. These are some of the reasons why Italy's fertility is low which the government failed to address.

Hence C is the correct answer.

**Instructions**

Read the passage below and choose the most appropriate answer for the questions that follow.

Passage II

The 'trolley problem' used to be an obscure question in philosophical ethics. It runs as follows: a trolley, or a train, is speeding down a track towards a junction. Some moustache-twirling evildoer has tied five people to the track ahead and another person to the branch line. You are standing next to a lever that controls the junction. Do nothing, and the five people will be killed. Pull the lever, and only one person dies. What is the ethical course of action?

The excitement around self-driving cars, though, has made the problem famous. A truly self-driving car, after all, will have to be given ethical instructions of some sort by its human programmers. That has led to a miniature boom for the world's small band of professional ethicists, who suddenly find themselves in hot demand.

In a paper just published in Nature, a team of psychologists and computer scientists describe a different approach. Rather than asking said a small band of philosophers for their thoughts, this team, led by Edmond Awad of the Massachusetts Institute of Technology (MIT), decided instead to ask the general public. They created the "Moral Machine", a website which presents visitors with a series of choices about whom to save and whom to kill. In one, for instance, a self-driving car experiences brake an ahead of a pedestrian crossing. If it carries on in a straight line, a man, a woman and two homeless people of unspecified sex will be run down. If it serves, the death count will be the same, but the victims will be two women and two male business executives. What should the car do?

The strongest preferences, expressed by respondents from all over the world, were for saving human lives over animal ones,

preferring to save many rather than few and prioritising children over the old. There were weaker preferences for saving women over men, pedestrians over passengers in the car and for taking action rather than doing nothing. Criminals were seen as literally sub-human ranking below dogs in the public's priority list, above cats.

Preferences differed between countries. The preference for saving women, for instance, was stronger in places with higher levels of gender equality. The researchers found that the world's countries clustered into three broad categories, which they dubbed "western" covering North America and the Christian cultural countries of Europe, "Eastern", including the Middle East, India and China and "Southern" Latin America and many of France's Former colonial possessions. Countries in the Eastern cluster, for instance, showed a weaker preference for sparing the young over the elderly, while the preference for humans over animals was less pronounced in southern nations. Self-driving cars, it seems, may need the ability to download new moralities when they cross national borders.

#### Question 46

Among the following, who would be the equivalent of the person pulling the lever in the 'trolley problem'?

- A Professional ethicists working for car manufacturing firms.
- B CEOs of multinational car manufacturing firms.
- C Driverless-car owners who use their cars to travel abroad.
- D Software-programmers who design software for driverless cars.

Answer: D

#### Explanation:

It is mentioned in the second paragraph, 'A truly self-driving car, after all, will have to be given ethical instructions of some sort by its human programmers ' Hence the equivalent of the person pulling the lever in the 'trolley problem' will be human programmers who give ethical instructions.

Though the excitement of self-driving cars led to the miniature boom of professional ethicists, It is because of the human programmers who gave ethical instructions of some sort to the self-driving cars which have led to the trolley problem. CEOs of multinational car manufacturing firms and driverless-car owners who use their cars to travel abroad are nowhere mentioned in the passage.

Hence D is the correct answer.

#### Question 47

The statement "self-driving cars...may need the ability to download new moralities when they cross national borders" implies that,

- A Car manufacturing firms face difficult choices in developing Car navigation software which will be acceptable to regulators in different countries.
- B Different countries have different regulations for self-driving cars which need to be downloaded by cars when they cross national boundaries.
- C National preferences differ with regard to whom self-driving cars should kill in an accident and navigation software needs to be modified accordingly.
- D Car manufacturing firms need to train local software programmers in ethics or train local professional ethicists to develop software in countries where they sell cars.

Answer: C

#### Explanation:

It is mentioned in the last paragraph that since the preferences to save differed among nations and the researchers found that the world's countries clustered into three broad categories, which they dubbed "western" covering North America and the Christian cultural countries of Europe, "Eastern", including the Middle East, India and China and "Southern" Latin America and many of France's Former colonial possessions. Clearly, C is the correct answer.

#### Question 48

Which of the following references in driverless-car navigation software is likely to get acceptance from the largest number of countries?

- A Saving three children and their two young female teachers crossing the road as opposed to five old men also crossing the road.
- B Saving three children and their two young female teachers each carrying a puppy as opposed to five criminals also crossing the road.
- C Saving three children and their two young female teachers travelling in a school bus as opposed to five old women traveling in a car.
- D Saving five young female teachers travelling in a school bus as opposed to five old women traveling in a car

**Answer: B**

**Explanation:**

It is evident from the lines in the fourth paragraph that 'The strongest preferences, expressed by respondents from all over the world, were for saving human lives over animal ones, preferring to save many rather than few and prioritising children over the old. There were weaker preferences for saving women over men, pedestrians over passengers in the car and for taking action rather than doing nothing. Criminals were seen as literally sub-human ranking below dogs in the public's priority list, above cats.' Saving many rather than a few was a preference from the largest number of passengers. Hence B is the correct answer.

**Question 49**

**Regulatory approval of which of the following preferences of car-navigation software is likely to face most uncertainty in a 'Southern' country with high levels of gender in-equality?**

- A Save older women as opposed to older men.
- B Save older women as opposed to young male animals.
- C Save older male animals as opposed to younger female animals.
- D Saving older women as opposed to young female animals.

**Answer: B**

**Explanation:**

In the Southern countries, it is given that there is a weaker preference while choosing between humans and animals. Moreover, it is given that this particular nation has high levels of gender equality, so there would hardly be any preference between either gender. So for the software to face the most uncertainty in this region, the two potential victims should be a human and an animal respectively and both of opposite genders. The option that best describes such a situation is Option B.

**Question 50**

**Which of the following, if achieved, might solve the ethical dilemmas faced by those designing navigation software for driverless cars?**

- A An international agreement to develop a separate signalling system for driverless cars
- B A solution to the 'trolley problem' and an international agreement that cars should run on rails instead of roads.
- C Formation of an international panel of professional ethicists to solve the 'trolley problem'.
- D An international agreement on guidelines for development of navigation software for self-driving cars.

**Answer: D**

**Explanation:**

Option A: An international agreement to develop a separate signalling system for driverless cars would not solve the dilemma because preferences differed among nations. Hence A is not the correct answer.  
 Option B: A solution to the 'trolley problem' and an international agreement that cars should run on rails instead of roads will not solve the dilemma because Trolley problem will have different preferences to save in different countries and whether cars should run on rail or roads is beyond the scope of the passage.  
 Option C: As explained in option B, formation of an international panel of professional ethicists to solve the 'trolley problem' will not

solve the dilemma

Option D: An international agreement on guidelines for development of navigation software for self-driving cars will solve the dilemma because preference to save differed among Nations. Having an international agreement on guidelines will help the self-driving cars. Hence D is the correct answer.

