2021-MA

EE24BTECH11020 - Ellanti Rohith

General Aptitude (GA)

1) The ratio of boys to girls in a class is 7 to 3.
Among the options below, an acceptable value for the total number of students in the class is:
[GATE 2021]

a) 21 b) 37 c) 50 d) 73

2) A polygon is convex if, for every pair of points, P and Q belonging to the polygon, the line segment PQ lies completely inside or on the polygon.
Which one of the following is **NOT** a convex polygon? [GATE 2021]

a)

b)

c)

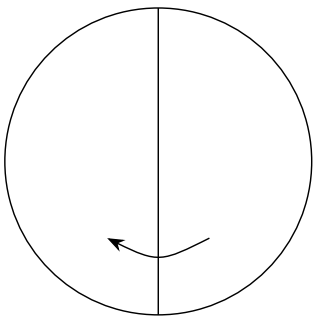
d)

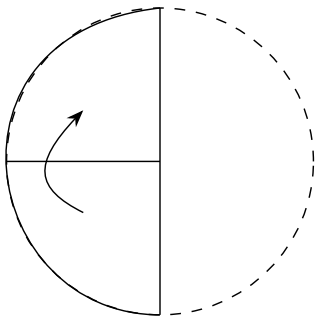
3) Consider the following sentences

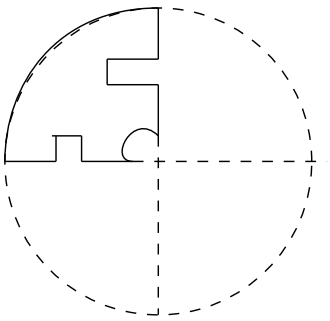
(i)Everyone in the class is prepared for the exam.
(ii)Babu invited Danish to his home because he loves playing chess. [GATE 2021]

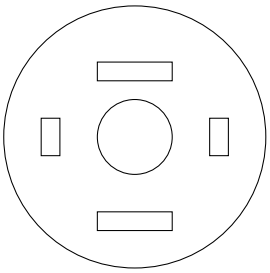
a) (i) is grammaticaly correct and (ii) is unambigious
b) (i) is grammaticaly incorrect and (ii) is unambigious
c) (i) is grammaticaly correct and (ii) is ambigious
d) (i) is grammaticaly incorrect and (ii) is unambigious

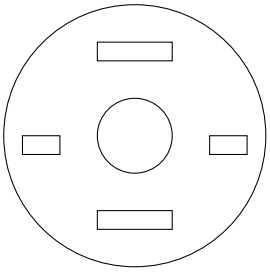
4) A circular sheet of paper is folded along the lines in the directions shown. The paper, after being punched in the final folded state as shown and unfolded in the reverse order of folding, will look like [GATE 2021]

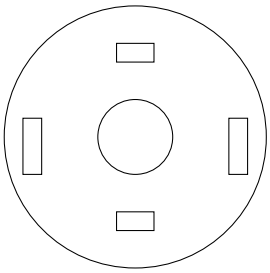


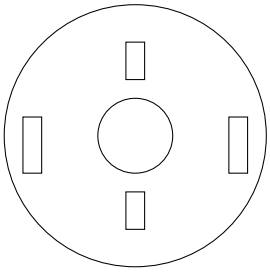




a) 

b) 

c) 

d) 

5) _____ is to *surgery* as *writer* is to _____
Which one of following options maintains a similar logical relation in above sentence? [GATE 2021]

a) Plan, outline
b) Hospital, library
c) Doctor, book
d) Medicine, grammar

6) We have 2 rectangular sheets of paper, M and N, of dimensions 6 cm $\times$ 1 cm each. Sheet M is rolled to form an open cylinder by bringing the short edges of the sheet together. Sheet N is cut into equal square patches and assembled to form the largest possible closed cube. Assuming the ends of the cylinder are closed, the ratio of the volume of the cylinder to that of the cube is

[GATE 2021]

a) $\frac{\pi}{2}$
b) $\frac{3}{\pi}$
c) $\frac{9}{\pi}$
d) 3π

7) Details of prices of two items P and Q are presented in the below table. The ratio of cost of item P to cost of item Q is 3:4. Discount is calculated as the difference between the marked price and the selling price. The profit percentage is calculated as the ratio of the difference between selling price and cost, to the cost

$$\text{Profit } \% = \left(\frac{\text{Selling Price} - \text{Cost}}{\text{Cost}}\right) \times 100.$$

The discount on item Q, as a percentage of its marked price, is

Items	Cost (in Rs.)	Profit %	Marked Price (in Rs.)
P	5,400	—	5,860
Q	—	25	10,000

[GATE 2021]

a) 25
b) 12.5
c) 10
d) 5

8) There are five bags each containing identical sets of ten distinct chocolates. One chocolate is picked from each bag. The probability that at least two chocolates are identical is _____

[GATE 2021]

a) 0.3024 b) 0.4235 c) 0.6976 d) 0.8125

9) Given below are two statements 1 and 2, and two conclusions I and II.

Statement 1: All bacteria are microorganisms.
Statement 2: All pathogens are microorganisms.
Conclusion I: Some pathogens are bacteria.
Conclusion II: All pathogens are not bacteria.

Based on the above statements and conclusions, which one of the following options is logically CORRECT?

[GATE 2021]

a) Only conclusion I is correct
b) Only conclusion II is correct
c) Either conclusion I or II is correct
d) Neither conclusion I nor II is correct

10) Some people suggest anti-obesity measures (AOM) such as displaying calorie information in restaurant menus. Such measures sidestep addressing the core problems that cause obesity: poverty and income inequality.
Which one of the following statements summarizes the passage?

[GATE 2021]

a) The proposed AOM addresses the core problems that cause obesity.
b) If obesity reduces, poverty will naturally reduce, since obesity causes poverty.
c) AOM are addressing the core problems and are likely to succeed.
d) AOM are addressing the problem superficially.

Mathematics(MA)

11) Let A be a 3×4 matrix and B be a 4×3 matrix with real entries such that AB is non-singular. Consider the following statements:

P: Nullity of A is 0.
Q: BA is a non-singular matrix.

Then

[GATE 2021]

a) both P and Q are TRUE
b) P is TRUE and Q is FALSE
c) P is FALSE and Q is TRUE
d) both P and Q are FALSE

12) Let $f(z) = u(x, y) + iv(x, y)$ for $z = x + iy \in \mathbb{C}$, where x and y are real numbers, be a non-constant analytic function on the complex plane $\mathbb{C}$. Let u_x, u_y and v_x, v_y denote the first order partial derivatives of $u(x, y) = \mathrm{Re}(f(z))$ and $v(x, y) = \mathrm{Im}(f(z))$ with respect to real variables x and y, respectively. Consider the following two functions defined on $\mathbb{C}$:

$$g_1(z) = u_x(x, y) - iu_y(x, y) \text{ for } z = x + iy \in \mathbb{C},$$

$$g_2(z) = v_x(x, y) + iv_y(x, y) \text{ for } z = x + iy \in \mathbb{C}.$$

Then

[GATE 2021]

a) both $g_1(z)$ and $g_2(z)$ are analytic in $\mathbb{C}$
b) $g_1(z)$ is analytic in $\mathbb{C}$ and $g_2(z)$ is NOT analytic in $\mathbb{C}$
c) $g_1(z)$ is NOT analytic in $\mathbb{C}$ and $g_2(z)$ is analytic in $\mathbb{C}$
d) neither $g_1(z)$ nor $g_2(z)$ is analytic in $\mathbb{C}$

13) Let $T(z) = \dfrac{az+b}{cz+d}$, $ad-bc \neq 0$, be the Mobius transformation which maps the points $z_1 = 0$, $z_2 = -i$, $z_3 = \infty$ in the z-plane onto the points $w_1 = 10$, $w_2 = 5-5i$, $w_3 = 5+5i$ in the w-plane, respectively. Then the image of the set $S = \{z \in \mathbb{C} : Re(z) < 0\}$ under the map $w = T(z)$ is

[GATE 2021]

a) $\{w \in \mathbb{C} : |w| < 5\}$
b) $\{w \in \mathbb{C} : |w| > 5\}$
c) $\{w \in \mathbb{C} : |w-5| < 5\}$
d) $\{w \in \mathbb{C} : |w-5| > 5\}$