

GATE
PH - 2021

EE24BTECH11061 - Rohith Sai

GENERAL APTITUDE (GA)

Single Correct 1 Mark each

- 1) (i) Arun and Aparna are here.
(ii) Arun and Aparna is here.
(iii) Arun's families is here.
(iv) Arun's family is here.

Which of the above sentences are grammatically CORRECT?

- a) (i) and (ii)
b) (i) and (iv)
- c) (ii) and (iv)
d) (iii) and (iv)

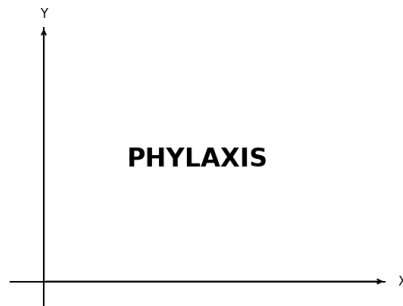


Fig. 2: Caption

- 2) The mirror image of the above text about the x-axis is

- a) PHYGLXIS
b) PHYGLXIS
- c) PHYGLXIS
d) PHYGLXIS

- 3) Two identical cube shaped dice each with faces numbered 1 to 6 are rolled simultaneously. The probability that an even number is rolled out on each dice is:

a) $\frac{1}{36}$
b) $\frac{1}{12}$

c) $\frac{1}{8}$
d) $\frac{1}{4}$

- 4) \oplus and \odot are two operators on numbers p and q such that $p \odot q = p - q$, and $p \oplus q = p \times q$
Then, $(9 \odot (6 \oplus 7)) \odot (7 \oplus (6 \odot 5)) =$

a) 40
b) -26

c) -33
d) -40

- 5) Four persons P, Q, R and S are to be seated in row. R should not be seated at the second position from the left end of the row. The number of distinct seating arrangements possible is:

a) 6
b) 9

c) 18
d) 24

Single Correct 2 Marks each

- 6) On a planar field, you travelled 3 units East from a point O. Next you travelled 4 units South to arrive at point P. Then you travelled from P in the North-East direction such that you arrive at a point that is 6 units East of point O. Next, you travelled in the North-West direction, so that you arrive at point Q that is 8 units North of point P.

The distance of point Q to point O, in the same units, should _____

a) 3
b) 4

c) 5
d) 6

- 7) The author said, "Musicians rehearse before their concerts. Actors rehearse their roles before the opening of a new play. On the other hand, I find it strange that many public speakers think they can just walk on to stage and start speaking. In my opinion, it is no less important for public speakers to rehearse their talks."

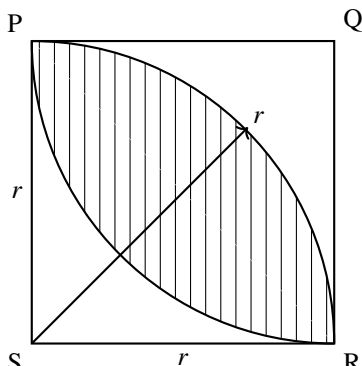
Based on the above passage, which one of the following is TRUE?

- | | |
|--|--|
| a) The author is of the opinion that rehearsing is important for musicians, actors and public speakers. | c) The author is of the opinion that rehearsing is more important only for musicians than public speakers. |
| b) The author is of the opinion that rehearsing is less important for public speakers than for musicians and actors. | d) The author is of the opinion that rehearsal is more important for actors than musicians. |

- 8) 1. Some football players play cricket.
2. All cricket players play hockey.

Among the options given below, the statement that logically follows from the two statements 1 and 2 above, is:

- a) No football player plays hockey. c) All football players play hockey.
 b) Some football players play hockey. d) All hockey players play football.



- 9) In the figure shown above, PQRS is a square. The shaded portion is formed by the intersection of sectors of circles with radius equal to the side of the square and centers at S and Q. The probability that any point picked randomly within the square falls in the shaded area is _____

- a) $4 - \frac{\pi}{2}$ c) $\frac{\pi}{2} - 1$
 b) $\frac{1}{2}$ d) $\frac{\pi}{4}$

- 10) A body floating in a liquid is in a stable state of equilibrium is its

- a) metacentre lies above its centre of gravity c) metacentre coincides with its centre of gravity
 b) metacentre lies below its centre of gravity d) centre of gravity is below its centre of buoyancy

- 11) In an equilateral triangle PQR, side PQ is divided into four equal parts, side QR is divided into six equal parts and side PR is divided into eight equal parts.

The length of each subdivided part in cm is an integer.

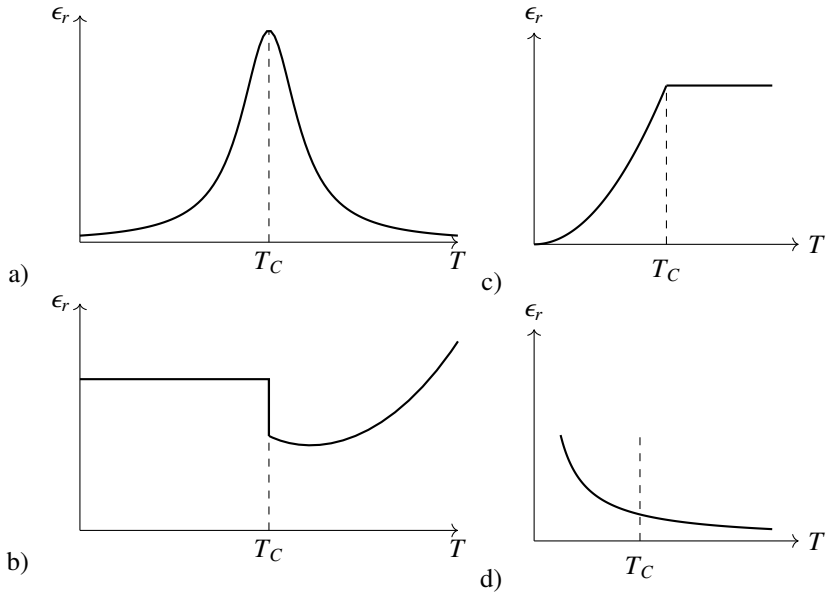
The minimum area of the triangle PQR possible, in cm^2 , is

- a) 18 c) $48\sqrt{3}$
 b) 24 d) $144\sqrt{3}$

PHYSICS (PH)

Single Correct 1 Mark each

- 12) Choose the graph that best describes the variation of dielectric constant (ϵ_r) with temperature (T) in a ferroelectric material. (T_c is the Curie temperature)



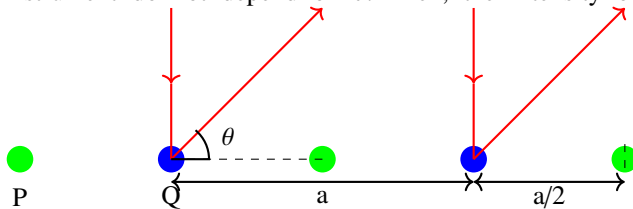
13) A matter wave is represented by the wave function

$$\psi(x, y, z, t) = A e^{i(4x + 3y + 5z - 10\pi t)}$$

where A is a constant. The unit vector representing the direction of propagation of this matter wave is

- | | |
|---|---|
| a) $\frac{4}{5\sqrt{2}}\hat{x} + \frac{3}{5\sqrt{2}}\hat{y} + \frac{1}{\sqrt{2}}\hat{z}$ | c) $\frac{1}{5\sqrt{2}}\hat{x} + \frac{3}{5\sqrt{2}}\hat{y} + \frac{1}{\sqrt{2}}\hat{z}$ |
| b) $\frac{3}{5\sqrt{2}}\hat{x} + \frac{4}{5\sqrt{2}}\hat{y} + \frac{1}{5\sqrt{2}}\hat{z}$ | d) $\frac{1}{5\sqrt{2}}\hat{x} + \frac{4}{5\sqrt{2}}\hat{y} + \frac{3}{5\sqrt{2}}\hat{z}$ |

14) As shown in figure, X-ray diffraction pattern is obtained from a diatomic chain of atoms P and Q. The diffraction condition is given by $a \cos \theta = n\lambda$, where n is the order of the diffraction peak. Here, a is the lattice constant and λ is the wavelength of the X-rays. Assume that atomic form factors and resolution of the instrument do not depend on θ . Then, the intensity of the diffraction peaks is



- | | |
|--|--------------------------------|
| a) lower for even values of n , when compared to odd values of n | c) zero for odd values of n |
| b) lower for odd values of n , when compared to even values of n | d) zero for even values of n |