MA
2024

EE24BTECH11063 - Y.Harsha Vardhan Reddy

Q.1 to Q.5 carry ONE mark each

1) If '→' denotes increasing order of intensity, then the meaning of the words [drizzle → rain → downpour] is analogous to [_____ → quarrel → feud]. Which one of the given options is appropriate to fill the blank?

a) bicker b) bog c) dither d) dodge

2) Statements:

1. All heroes are winners.
2. All winners are lucky people.

Inferences:

I. All lucky people are heroes.
II. Some lucky people are heroes.
III. Some winners are heroes.

Which of the above inferences can be logically deduced from statements 1 and 2?

a) Only I and II b) Only II and III

c) Only I and III d) Only III

3) A student was supposed to **multiply** a positive real number p with another positive real number q. Instead, the student **divided** p by q. If the percentage error in the student's answer is 80%, the value of q is

a) 5 b) $\sqrt{2}$ c) 2 d) $\sqrt{5}$

4) If the sum of the first 20 consecutive positive odd numbers is divided by 20^2, the result is

a) 1 c) 2 e) $\frac{1}{2}$
b) 20 d)

5) If the sum of the first 20 consecutive positive odd numbers is divided by 20^2, the result is

a) 1 b) 20 c) 2 d) $\frac{1}{2}$

Q.6 TO Q.10 CARRY TWO MARKS EACH

6) In the given text, the blanks are numbered (i)-(iv). Select the best match for all the blanks. Yoko Roi stands (i) _____ as an author for standing (ii) _____ as an honorary fellow, after she stood (iii) _____ her writings that stand (iv) _____ the freedom of speech.

a) (i) out (ii) down (iii) in (iv) for b) (i) down (ii) out (iii) by (iv) in

c) (i) down (ii) out (iii) for (iv) in d) (i) out (ii) down (iii) by (iv) for

7) Seven identical cylindrical chalk-sticks are fitted tightly in a cylindrical container. The figure below7 shows the arrangement of the chalk-sticks inside the cylinder. The length of the container is equal to the length of the chalk-sticks. The ratio of the occupied space to the empty space of the container is

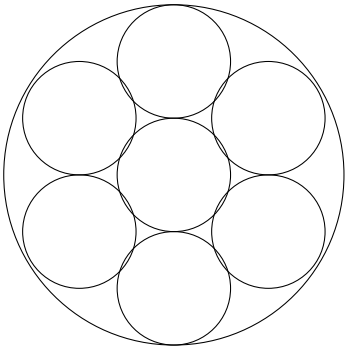


Fig. 7

a) $\frac{5}{2}$ b) $\frac{7}{2}$ c) $\frac{9}{2}$ d) 3

8) The plot below8 shows the relationship between the mortality risk of cardiovascular disease and the number of steps a person walks per day. Based on the data, which one of the following options is true?

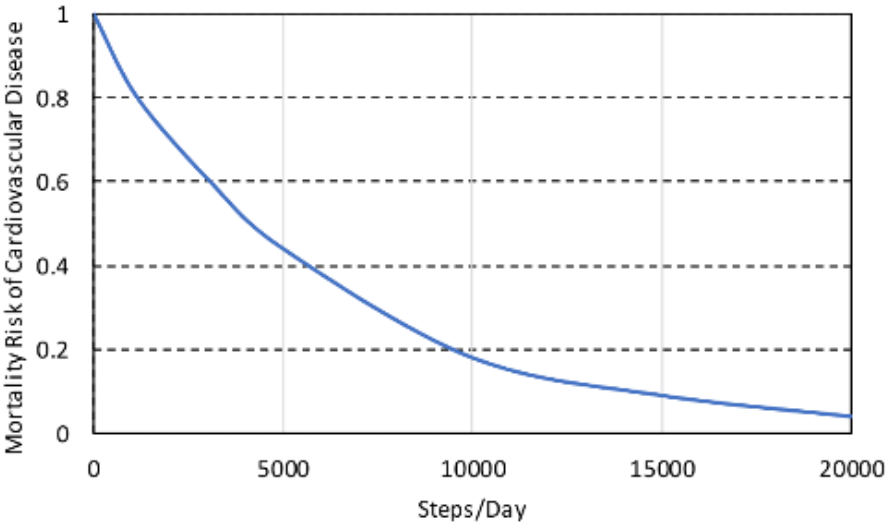


Fig. 8: Steps/Day

a) The risk reduction on increasing the steps/day from 0 to 10000 is less than the risk reduction on increasing the steps/day from 10000 to 20000.
b) The risk reduction on increasing the steps/day from 0 to 5000 is less than the risk reduction on increasing the steps/day from 15000 to 20000.
c) For any 5000 increment in steps/day the largest risk reduction occurs on going from 0 to 5000.
d) For any 5000 increment in steps/day the largest risk reduction occurs on going from 15000 to 20000.

9) Five cubes of identical size and another smaller cube are assembled as shown in Figure A9. If viewed from direction X, the planar image of the assembly appears as Figure B.

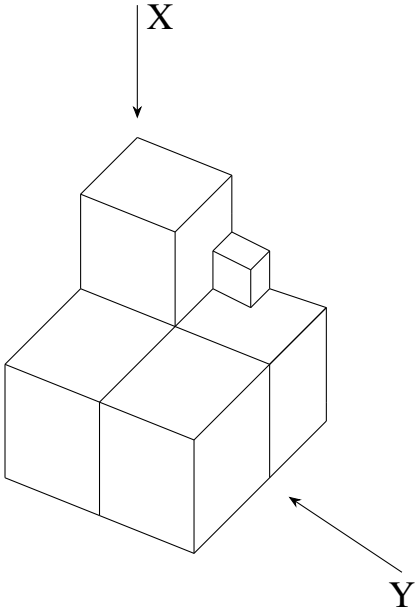


Figure A

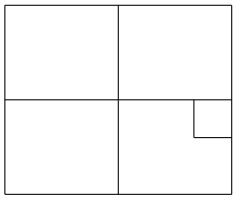
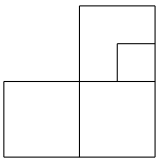


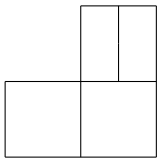
Figure B

Fig. 9

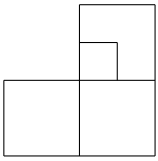
If viewed from direction *Y*, the planar image of the assembly (Figure A) will appear as:



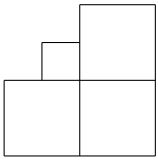
(a)



(b)



(c)



(d)

10) Visualize a cube that is held with one of the four body diagonals aligned to the vertical axis. Rotate the cube about this axis such that its view remains unchanged. The magnitude of the minimum angle of rotation is

a) $120°$ b) $60°$ c) $90°$ d) $180°$

MCQ

11) Consider the following condition on a function $f : \mathbb{C} \to \mathbb{C}$
$|f(z)| = 1$ for all $z \in \mathbb{C}$ such that $\mathrm{Im}(z) = 0$. (P)
Which one of the following is correct?

a) There is a non-constant analytic polynomial f satisfying (**P**)
b) Every entire function f satisfying (**P**) is a constant function
c) Every entire function f satisfying (**P**) has no zeroes in $\mathbb{C}$
d) There is an entire function f satisfying (**P**) with infinitely many zeroes in $\mathbb{C}$

12) Let C be the ellipse $\{z \in \mathbb{C} : |z - 2| + |z + 2| = 8\}$ traversed counter-clockwise. The value of the contour integral

$$\oint_C \frac{z^2\, dz}{z^2 - 2z + 2}$$

is equal to

a) 0 b) $2\pi i$ c) $4\pi i$ d) $-\pi i$

13) Let X be a topological space and $A \subseteq X$. Given a subset S of X, let $\mathrm{int}(S)$, ∂S, and $\overline{S}$ denote the interior, boundary, and closure, respectively, of the set S. Which one of the following is NOT necessarily true?

a) $\mathrm{int}(X \setminus A) \subseteq X \setminus \overline{A}$
b) $A \subseteq \overline{A}$
c) $\partial A \subseteq \partial(\mathrm{int}(A))$
d) $\partial(\overline{A}) \subseteq \partial A$