1

(2023 - 4 Marks)

(2023 - 4 Marks)

(2023 - 4 Marks)

d) 18

d) 2006

d) $q \wedge (\neg p)$

EE24BTECH11006 - Arnav Mahishi

2) Let $P = \begin{pmatrix} \frac{\sqrt{3}}{2} & \frac{1}{2} \\ \frac{-1}{2} & \frac{\sqrt{3}}{2} \end{pmatrix}$, $A = \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}$ and $Q = PAP^T$. If $P^TQ^{2007}P = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$, then

c) 20

c) 2005

c) $(\neg p) \lor a$

1) The area of the region $\{(x, y) : x^2 \le y \le 8 - x^2, y \le 7\}$

b) 21

b) 2007

b) $p \vee (\neg q)$

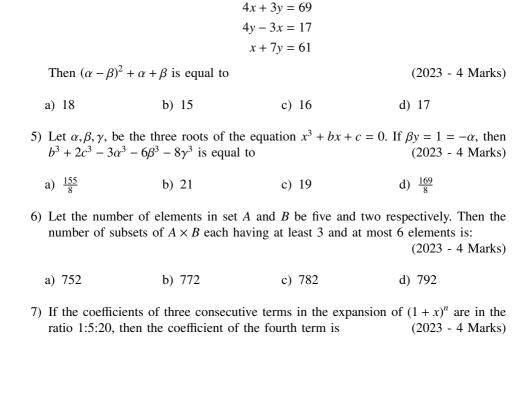
4) Let $C(\alpha, \beta)$ be the circumcenter of the triangle formed by the lines

3) Negation of $(p \rightarrow q) \rightarrow (q \rightarrow q)$ is

a) 24

a) 2004

a) $(\neg q) \land p$



d) 1817

d) 317

c) A + C + D is not divisible by B

d) A + B + D is divisible by 5

(2023 - 4 Marks)

(2023 - 4 Marks)

10) The shortest distance between the lines $\frac{x-4}{4} = \frac{y+2}{5} = \frac{z+3}{3}$ and $\frac{x-1}{3} = \frac{y-3}{4} = \frac{z-4}{2}$ (2023 - 4 Marks)			
a) $2\sqrt{6}$	b) $3\sqrt{6}$	c) $6\sqrt{3}$	d) $6\sqrt{2}$
11) The number of arrangements of the letters of the word "INDEPENDENCE" in which all the vowels always occur together is (2023 - 4 Marks)			
a) 16800	b) 14800	c) 18000	d) 33600
12) If the points with position vectors $\alpha \hat{i} + 10\hat{j} + 13\hat{k}$, $6\hat{i} + 11\hat{j} + 11\hat{k}$, $\frac{9}{2}\hat{i} + \beta\hat{j} - 8\hat{k}$ are collinear then, $(19\alpha - 6\beta)^2$ is equal to (2023 - 4 Marks)			
a) 49	b) 36	c) 25	d) 16
13) In a bolt factory, machines <i>A</i> , <i>B</i> , and <i>C</i> manufacture respectively 20%, 30%, and 50% of the total bolts. Of their output 3,4, and 2 percent are respectively defective bolts. A bolt is drawn at random from the product. If the bolt drawn is found to be defective, then the probabilty that it is manufactured by the machine <i>C</i> . (2023 - 4 Marks)			
a) $\frac{5}{14}$	b) $\frac{3}{7}$	c) $\frac{9}{28}$	d) $\frac{2}{7}$
14) If for $z = \alpha + i\beta$, $ z + 2 = z + (4 + i)$, then $\alpha + \beta$ and $\alpha\beta$ are the roots of the equation (2023 - 4 Marks)			
a) $x^2 + 3x - 4$	b) $x^2 + 7x + 12$	c) $x^2 + x - 12$	d) $x^2 + 2x - 3$
15) $\lim_{x\to 0} \left(\left(\frac{\left(1-\cos^2(3x)\right)}{\cos^3(4x)} \right) \right)$	$\left(\frac{\sin^3(4x)}{\log_e(2x+1)^5}\right)$ is equal	to	(2023 - 4 Marks)
15) $\lim_{x\to 0} \left(\left(\frac{(1-\cos^2(3x))}{\cos^3(4x)} \right) \left(\frac{\sin^3(4x)}{\log_e(2x+1)^5} \right) \right)$ is equal to (2023 - 4 Marks)			

a) 5481

a) 325

least value. Then

b) A + B = 5(D - C)

a) A + B is divisible by D

b) 3654

b) 346

PQR. If c - m = 6 then $(PQ)^2$ is

c) 2436

c) 296

8) Let R be the focus of the parabola $y^2 = 20x$ and the line y = mx + c intersect the parabola at two points P and Q. Let the point G(10, 10) be the centroid of the triangle

9) Let $S_K = \frac{1+2+...+K}{K}$ and $\sum_{i=1}^n S_j^2 = \frac{n}{A} (Bn^2 + Cn + D)$ where $A, B, C, D \in N$ and A has

3

a) 24

b) 19

c) 18

d) 15