NUSTrive by Nowsherwan

For Lectures/Tests/FLPs. Contact 03369374191

Vectors Key

i) B → Mod always +ve

2) B

3) D.

4) A → Check theory Q Series

5) A

6) A

7) C

8) B

9) B

10) A

11) D → Det 0 at $q=6$, Proving they Coplanar and non zero for $q=3$

12) D

13) C → If it was position vector then O was origin since position vector start from origin

14) A → $\frac{1}{q} \rightarrow \frac{1}{\vec{q}} \frac{q}{q} \rightarrow \frac{\vec{q}}{|q|^2}$

15) A

16) B

17) C

18) B

19) $i+j \Rightarrow$ xy vector { so z ka sath 90° (z component coeffecient ?) — Direction Cosine

or $\cos\gamma = \frac{|z|}{|A|} \Rightarrow \frac{|0|}{\sqrt{1^2+1^2}} \Rightarrow 0$

20) $\cos\beta = \frac{|\sqrt{3}|}{|A|} \Rightarrow \frac{\sqrt{3}}{\sqrt{1^2+\sqrt{3}^2}} \Rightarrow \frac{\sqrt{3}}{2} \Rightarrow 30^\circ$

21) A

22) $1-\cos^2\alpha + 1-\cos^2\beta + 1-\cos^2\gamma \Rightarrow 3-(\cos^2\alpha + \cos^2\beta + \cos^2\gamma) \Rightarrow 3-1 \Rightarrow 2$

24) D

25) B

26) Check theory

27) B

28) $a \cdot b = ab\cos\theta \Rightarrow \frac{ab}{2} = ab\cos\theta \Rightarrow \cos\theta = \frac{1}{2} \Rightarrow 60^\circ$

29) $i \cdot j = 0, j \cdot k = 0, i \cdot j = 0, i \cdot i = 1 \Rightarrow 0+0+0+0^2+1^2 \Rightarrow 1$

30) If vectors perp $\Rightarrow$ their dot product is 0

$3m + 72 + 72 = 0$

$3m = -144$

$m = -48$

31) $i - j + k = -(-i + j - k)$

B

32) If parallel, ratio of coeffecients = constant

$\frac{2}{m} = \frac{-3}{-6} = \frac{4}{8}$

$\frac{2}{m} = \frac{1}{2} \Rightarrow m = 4$

33) $(a \cdot b)^2 \Rightarrow a^2 b^2 \cos^2\theta \Rightarrow a^2 b^2 (1 - \sin^2\theta)$

$a^2b^2 - a^2b^2\sin^2\theta \Rightarrow a^2b^2 - (a \times b)^2$

34) $ab\cos\theta = ab\sin\theta \Rightarrow \tan\theta = 1 \Rightarrow \frac{\pi}{4}$

35) $|a+b| = \sqrt{a^2+b^2+2ab\cos\theta}$

$|a-b| = \sqrt{a^2+b^2-2ab\cos\theta}$

$\Rightarrow \sqrt{a^2+b^2+2ab\cos\theta} = \sqrt{a^2+b^2-2ab\cos\theta}$

$\Rightarrow 4ab\cos\theta = 0$

$\cos\theta = 0 \Rightarrow 90^0$

36) $|a+b| = 1$

$\sqrt{a^2+b^2+2ab\cos\theta} = 1$

$1^2+1^2+2ab\cos\theta = 1 \Rightarrow 2(1)(1)(\cos\theta) = -1$

$\cos\theta = -\frac{1}{2} \Rightarrow 120^0$

37) B

38) $i \cdot j = 0$, $j \times i = -k$

$0 \times (-k) \Rightarrow$ Ans isnt $0 \Rightarrow$ its undefined

You cant cross scalar with vector

39) c → Check Q series theory

40) $i \cdot j \times k = i \cdot (i) \Rightarrow 1$ ✗ wrong

$i \cdot (j \times k) \Rightarrow i \cdot (i) \Rightarrow 1$ ✓

So $(i \cdot j \times k)''$ ⇒ not 1 if $(i \cdot (j \times k))''$ ⇒

then $(i \cdot i)'' \Rightarrow (1)'' \Rightarrow 1$

41) c

42) $\begin{vmatrix} i & j & k \\ 1 & -1 & 1 \\ 3 & -2 & 1 \end{vmatrix}$ → solve this det

43) $a^2b^2\sin^2\theta + a^2b^2\cos^2\theta$

$a^2b^2(\underbrace{\sin^2\theta + \cos^2\theta}_{1}) \Rightarrow a^2b^2 \Rightarrow |a|^2|b|^2$

44) $|AC \times BD|$ → Check Q series theory

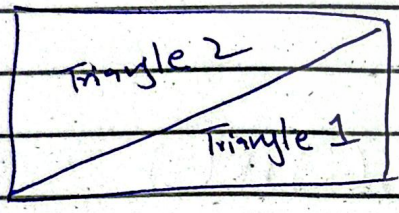
v.imp → Net ma atay ha Areas maloom krna through vectors and Lines

5) Two triangle = one rectangle

so 2:1

NusTrive by Nowsherwan

For Lectures/Tests/ELPs - Contact 03369374191



46) → B ⇒ $\sqrt{\cos^2\theta + \sin^2\theta}$ ⇒ 1 → Mod 1

47) C

48) find $a \cdot b \times c$ or scalar triple product →

B

49) F·d = work done 27 - 2 + 1 ⇒ 26 J

50) $a \cdot b + a \cdot c = b \cdot a - b \cdot c$ ⇒ $a \cdot b = b \cdot a$ (commutative) so Cancel

⇒ $a \cdot c + b \cdot c = 0$

$c \cdot (a + b) = 0$

51) Angle b/w vectors → Dot product or Cross

$(A+B) \cdot (A-B) = |A+B||A-B|\cos\theta$

$A^2 - B^2 = |A+B||A-B|\cos\theta$ so $\cos\theta|A+B||A-B| = 0$

Since $|A| = |B| \rightarrow A^2 - B^2 = 0$ $\cos\theta = 0 \Rightarrow 90^\circ$

52) Find length of Each Side by distance formula then add all → D

53) (1,2,3.) (0,0,0)

(1-0, 2-0, 3-0) ⇒ (1,2,3)

Moment = r × F (1,2,3) × (1,1,1)

→ $\begin{vmatrix} i & j & k \\ 1 & 2 & 3 \\ 1 & 1 & 1 \end{vmatrix}$ ⇒ $i(2-3) - j(-2) + k(-1)$

$i + 2j - k$

54) a×b find kro

55) Infinite Components but only 3 rectangular Components

56) a×b = c → into the plane and out the plane

a×b Gives two vectors ⊥ to it so c

57)

57) $OM = \frac{OP+OQ}{2} \Rightarrow \frac{3a-2b+c+a+4b-c}{2} \Rightarrow 2a+b$

58) $i \cdot i + j \cdot (-j) + k \cdot (k)$

$1 + (-1) + 1 \Rightarrow 2$

59) find $a \cdot b \times c$ → formula for volume of Parallelopiped

then $\frac{1}{6}$ Volume of Parallelopiped = Vol of tetrahedron

check book formula

Net ma ata ha

60) Max = 20+25 (Parallel)

Min = 25-20 or |20-25| (Anti parallel)

range = $5 \leq x \leq 45$

12 comes in the range so C

61) → first find unit vector of $i+2j-k$

$\frac{i+2j-k}{\sqrt{1^2+2^2+1^2}} \Rightarrow \frac{i+2j-k}{\sqrt{6}}$

Now multiply required Magnitude

$\Rightarrow \frac{1}{\sqrt{6}} \left(\frac{i+2j-k}{\sqrt{6}} \right)$

Imp → Net ma Aya tha

★ Angle b/w Components of Vectors

$\Rightarrow \tan^{-1}\left|\frac{y}{x}\right|$

★ Angle b/w two vectors → Dot product or Cross

(Dot product ↓ Prefer)

★ Angle of a vector with x, y, z axis

⇒ Direction Cosines

e.g. with x-axis ⇒ $\cos\alpha = \frac{x}{|A|}$

★ Angle of Resultant with +ve x-axis

$\Rightarrow \tan\theta = \frac{P\sin\alpha}{Q + P\cos\alpha}$

when P/Q are added

★ $R = \sqrt{A^2 + B^2 + 2AB\cos\theta}$