TEST - 01

ULTIMATE KCET CRASH COURSE 2026

MATHS

Q1 If $A=\begin{bmatrix}\cos 2\theta & -\sin 2\theta \\ \sin 2\theta & \cos 2\theta\end{bmatrix}$ and A + A^T = I, where I is the unit matrix of 2×2 and A^T is the transpose of A, then the value of q is equal to

(A) π/6 (B) π/3
(C) π (D) $3\pi/2$

Q2 If $A=\begin{bmatrix}3 & 1 \\ -1 & 2\end{bmatrix}$ then A^2 - 5A is equal to

(A) I (B) -I
(C) 7I (D) -7I

Q3 If A is a matrix of order m x n and B is a matrix such that AB' and B'A are both defined, the order of the matrix B is

(A) m × m (B) n × n
(C) n × m (D) m × n

Q4 The system of linear equations x + y + z = 6, x + 2y + 3z = 10 and x + 2y + az = b has no solution when________

(A) $a=3,\ b\neq 10$
(B) $b=3,\ a\neq 10$
(C) $a=2,\ b\neq 3$
(D) $b=2,\ b=3$

Q5 If $A=\begin{bmatrix}\alpha & 2 \\ 2 & \alpha\end{bmatrix}$ and $|A^3|$ = 27, then a = ________

(A) ± 2 (B) $\pm\sqrt{5}$
(C) ± 1 (D) $\pm\sqrt{7}$

Q6 Evaluate $\begin{vmatrix}\cos 15^\circ & \sin 15^\circ \\ \sin 75^\circ & \cos 75^\circ\end{vmatrix}$.

(A) 0 (B) 3
(C) 1 (D) 2

Q7 If $\vec{a}=p\hat{i}-\hat{j}+8\hat{k}$ and $\vec{b}=2\hat{i}+4\hat{j}+q\hat{k}$ and $\left(\vec{a}+3\vec{b}\right)\times\left(3\vec{a}-\vec{b}\right)=\vec{0}$, then p - q is equal to

(A) 63/2 (B) 63/4
(C) -63/2 (D) -63/4

Q8 If $|\vec{a}|=5$, $|\vec{b}|=2$ and $\vec{a}\cdot\vec{b}=6$ then the value of $|\vec{a}\times\vec{b}|$

(A) 6 (B) 10
(C) 16 (D) 8

Q9 If $\vec{a}, \vec{b}, \vec{c}$ are unit vectors and q is the angle between them, then $|\vec{a}-\vec{b}|=$

(A) 2 cos q/2 (B) 2 sin q/2
(C) 2 cos q (D) 2 sin q

Q10 The angle between a line whose direction ratios are in the ratio 2 : 2 : 1 and a line joining (3, 1, 4) to (7, 2, 12) is

(A) $\cos^{-1}$ (2/3) (B) $\cos^{-1}$ (-2/3)
(C) $\tan^{-1}$ (2/3) (D) None of these

Q11 If the line joining (2, 3, -1) and (3, 5, -3) is perpendicular to the line joining (1, 2, 3) and (3, 5, l) then l =

(A) -3 (B) 2
(C) 5 (D) 7

Q12 Find the shortest distance between the lines $\vec{r}=\left(\hat{i}+2\hat{j}+\hat{k}\right)+\lambda\left(\hat{i}-\hat{j}+\hat{k}\right)$ and $\vec{r}=\left(2\hat{i}-\hat{j}-\hat{k}\right)+\mu\left(2\hat{i}+\hat{j}+2\hat{k}\right)$

(A) $\frac{3\sqrt{3}}{2}$ units (B) $\frac{3}{\sqrt{2}}$ units
(C) 3/2 units (D) $\frac{1}{\sqrt{2}}$ units

Q13 Solution set of the inequations 2x - 1 $\leq$ 3 and $3x + 1 \geq -5$ is [-k, k], then k =

(A) 1 (B) 2

(C) 3 (D) 4

Q14 Solve $4x + 3 \geq 2x + 17,\ 3x - 5 < -2.$

(A) (-1, 7)

(B) (7, ∞)

(C) $(-\infty,\ -1)$

(D) No solution

Q15 Find the domain of the function $f(x) = \sqrt{\log_{1/2}\left(\frac{5x-x^2}{4}\right)}$

(A) $(-\infty,\ 5)$

(B) $(0,\ 1] \cup [4,\ 5)$

(C) (0, 5)

(D) (4, ∞)

Q16 The domain of the function $f(x) = \frac{\log(2x-3)}{\sqrt{x-1}} + \sqrt{5-2x}$ is

(A) [1, 5/2) (B) [3/2, 5/2)

(C) [1, 5/2] (D) (3/2, 5/2]

Q17 The domain of the function f defined by $f(x) = \sqrt{4-x} + \frac{1}{\sqrt{x^2-1}}$ is equal to

(A) $(-\infty,\ -1) \cup (1,\ 4]$

(B) $(-\infty,\ -1] \cup (1,\ 4]$

(C) $(-\infty,\ -1) \cup [1,\ 4]$

(D) $(-\infty,\ -1) \cup [1,\ 4)$

Q18 If $\vec{a} = 2\hat{i} + \hat{j} + \hat{k},\ \vec{b} = \hat{i} - \hat{j} - 4\hat{k}$ and $\vec{c} = \hat{i} + \hat{j} + \hat{k}$ are such that $\vec{a} + \lambda\vec{b}$ is perpendicular to $\vec{c}$, then the value of l is

(A) 1 (B) ±1

(C) -1 (D) 0

Q19 The vectors $AB = 4\hat{i} + 3\hat{k}$ and $AC = 5\hat{i} + 2\hat{j} - 4\hat{k}$ are the sides of a DABC. The length of the median through A is

(A) $\sqrt{18}$ (B) $\sqrt{72}$

(C) $\sqrt{43/2}$ (D) $\sqrt{\frac{33}{2}}$

Q20 If the number of terms in the binomial expansion of $(5x + 3)^{4n}$ is 13, then the value of n is

(A) 3 (B) 4

(C) 5 (D) 6

Q21 The value of $\tan^{-1}\left[2\cos\left(2\sin^{-1}\frac{1}{2}\right)\right]$

(A) -p/4 (B) p/4

(C) p/2 (D) None of these

Q22 $\tan\left\{\frac{\pi}{4} + \frac{1}{2}\cos^{-1}\frac{a}{b}\right\} + \tan\left\{\frac{\pi}{4} - \frac{1}{2}\cos^{-1}\frac{a}{b}\right\} =$

(A) 2a/b (B) b/a

(C) 2b/a (D) a/b

Q23 If $\tan^{-1}2$ and $\tan^{-1}3$ are two anlges of a triangle, then the third angle is

(A) p/2 (B) p/3

(C) p/4 (D) p/6

Q24 $\sin^4\frac{\pi}{8} + \sin^4\frac{3\pi}{8} + \sin^4\frac{5\pi}{8} + \sin^4\frac{7\pi}{8}$ is equal to

(A) 1 (B) 3/2

(C) 2 (D) 1/4

Q25 $\sin 780^\circ\ \sin 480^\circ + \cos 120^\circ \sin\ 150^\circ =$

(A) $\sqrt{3}/2$ (B) 1

(C) 1/2 (D) 1/4

Q26 If $\frac{\sin^2 x - 2\cos^2 x + 1}{\sin^2 x + 2\cos^2 x - 1} = 4$, then the value of 2 $\tan^2$x is

(A) 3 (B) 4

(C) 5 (D) 6

Q27 The value $^{20}C_3 + {}^{19}C_3 + {}^{18}C_3 + {}^{17}C_3 + {}^{16}C_3$ is $+ {}^{16}C_4$

(A) $^{20}C_4$ (B) $^{21}C_4$

(C) $^{21}C_3$ (D) $^{20}C_3$

Q28 If A and B are non-empty sets, then $(A \cap B) \cup (A - B)$ is equal to

(A) B (B) A

(C) A' (D) B'

Q29 If A = {x : x is a factor of 18}, B = {x : x is a factor of 24} then $A \cap B =$

(A) {1, 2} (B) {1, 3}

(C) {1, 6} (D) {1, 2, 3, 6}

Q30 If n(A) = 2 and total number of possible relations from set A to set B is 4096 then n(B) is

(A) 6 (B) 12

(C) 512 (D) 24

Answer Key

Q1	A
Q2	D
Q3	D
Q4	A
Q5	D
Q6	A
Q7	A
Q8	D
Q9	B
Q10	A
Q11	D
Q12	B
Q13	B
Q14	D
Q15	B
Q16	D
Q17	A
Q18	A
Q19	C
Q20	A
Q21	B
Q22	C
Q23	C
Q24	B
Q25	C
Q26	C
Q27	B
Q28	B
Q29	D
Q30	A

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

Given, $A=\begin{bmatrix}\cos 2\theta & -\sin 2\theta \\ \sin 2\theta & \cos 2\theta\end{bmatrix}$

$\Rightarrow A^T=\begin{bmatrix}\cos 2\theta & \sin 2\theta \\ -\sin 2\theta & \cos 2\theta\end{bmatrix}$

Al,so, $A+A^T=I$

$\Rightarrow \begin{bmatrix}2\cos 2\theta & 0 \\ 0 & 2\cos 2\theta\end{bmatrix}=\begin{bmatrix}1 & 0 \\ 0 & 1\end{bmatrix}$

On comparing, we get

$2\cos 2\theta=1 \Rightarrow \cos 2\theta=\frac{1}{2} \Rightarrow \theta=\frac{\pi}{6}$

Video Solution:

Q2 Text Solution:

Given, $A=\begin{bmatrix}3 & 1 \\ -1 & 2\end{bmatrix}$

$\Rightarrow A^2=\begin{bmatrix}3 & 1 \\ -1 & 2\end{bmatrix}\cdot\begin{bmatrix}3 & 1 \\ -1 & 2\end{bmatrix}$

$=\begin{bmatrix}8 & 5 \\ -5 & 3\end{bmatrix}$

$\therefore A^2-5A=\begin{bmatrix}8 & 5 \\ -5 & 3\end{bmatrix}-5\begin{bmatrix}3 & 1 \\ -1 & 2\end{bmatrix}$

$=\begin{bmatrix}8 & 5 \\ -5 & 3\end{bmatrix}-\begin{bmatrix}15 & 5 \\ -5 & 10\end{bmatrix}=\begin{bmatrix}-7 & 0 \\ 0 & -7\end{bmatrix}=$

$-7I$

Video Solution:

Q3 Text Solution:

$0(A)=m\times n$

$0(B)=?\quad \therefore 0(B)=m\times n$

Let $0(B)=p\times q$

$AB'=m\times n-q\times p$

$\Rightarrow n=q$

Also $B'A=q\times p-m\times n$

$\Rightarrow p=m$

Video Solution:

Q4 Text Solution:

$\begin{vmatrix}1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 2 & a\end{vmatrix}=0$

$1(2a-6)-1(a-3)+1(2-2)=0$

$2a-6-a+3=0$

$a-3=0$

$a=3$

By option verification

$b\neq 0$

if $b=10$

System will have infinite solution

Video Solution:

Q5 Text Solution:

Given, $|A^3| = 27 \Rightarrow |A|^3$

$= 27 \quad [\because |A^n| = |A|^n]$

$\Rightarrow |A| = 3 \Rightarrow \begin{vmatrix} \alpha & 2 \\ 2 & \alpha \end{vmatrix} = 3$

$\Rightarrow \alpha^2 - 4 = 3 \Rightarrow \alpha^2 = 7 \Rightarrow \alpha = \pm\sqrt{7}$

Video Solution:

Q6 Text Solution:

$\begin{vmatrix} \cos 15^\circ & \sin 15^\circ \\ \sin 75^\circ & \cos 75^\circ \end{vmatrix} = \cos 15^\circ \cos 75^\circ$

$- \sin 75^\circ \sin 15^\circ$

$= \cos(15^\circ + 75^\circ) = \cos(90^\circ) = 0$

Video Solution:

Q7 Text Solution:

$(\vec{a} + 3\vec{b}) \times (3\vec{a} - \vec{b}) = \vec{0}$ (given)

or $3(\vec{a} \times \vec{a}) - (\vec{a} \times \vec{b}) + 9(\vec{b} \times \vec{a})$

$-3(\vec{b} \times \vec{b}) = \vec{0}$

or $-(\vec{a} \times \vec{b}) - 9(\vec{a} \times \vec{b}) = \vec{0}$

or $-10(\vec{a} \times \vec{b}) = \vec{0}$ and $\vec{a} \times \vec{b} = \vec{0}$

or $\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ p & -1 & 8 \\ 2 & 4 & q \end{vmatrix} = 0\hat{i} + 0\hat{j} + 0\hat{k}$

By comparison, we get

$-q - 32 = 0, \quad 4p + 2 = 0 \Rightarrow q =$

-32 or $p = -\frac{1}{2}$

$\therefore p - q = -\frac{1}{2} + 32 = \frac{63}{2}$.

Video Solution:

Q8 Text Solution:

$|\vec{a} \times \vec{b}| = |\vec{a}||\vec{b}| \sin\theta$

$\vec{a} \cdot \vec{b} = |\vec{a}||\vec{b}| \cos\theta$

$6 = 5 \times 2 \cos\theta$

$\cos\theta = \frac{6}{10}$

$\cos\theta = \frac{3}{5}$

$\therefore \sin\theta = \frac{4}{5}$

$\Rightarrow |\vec{a} \times \vec{b}| = 5 \times 2 \times \frac{4}{5}$

$|\vec{a} \times \vec{b}| = 8$

Video Solution:

Q9 Text Solution:

$\vec{a}, \vec{b}, \vec{c}$ are unit vectors.

Now, $\left|\vec{a}-\vec{b}\right| = \left|\vec{a}\right|^2 + \left|\vec{b}\right|^2 - 2\vec{a}\cdot\vec{b} = 1$

$+1 - 2\left|\vec{a}\right|\left|\vec{b}\right|\cos\theta$

$= 2 - 2\cos\theta = 2(1-\cos\theta) = 4\sin^2\frac{\theta}{2}$

Hence, $\left|\vec{a}-\vec{b}\right| = 2\sin\frac{\theta}{2}$

Video Solution:

Q10 Text Solution:

Let $a_1 = 2x,\ b_1 = 2x$ and $c_1 = x$

Clearly, $a_2 = 7-3 = 4,\ b_2 = 2-1 = 1,$

$c_2 = 12-4 = 8$

$\therefore \cos\theta = \frac{2x\times4+2x\times1+x\times8}{\sqrt{4x^2+4x^2+x^2}\sqrt{16+1+64}} = \frac{18}{3x\times9} = \frac{2}{3}$

$\Rightarrow \theta = \cos^{-1}\left(\frac{2}{3}\right)$

Video Solution:

Q11 Text Solution:

DR's of the given lines are 1, 2, -2 and 2, 3, l-3.

Since, lines are perpendicular

$\therefore a_1a_2 + b_1b_2 + c_1c_2 = 0$

$\Rightarrow 1\times2 + 2\times3 - 2(\lambda-3) = 0 \Rightarrow \lambda = 7$

Video Solution:

Q12 Text Solution:

The given lines are

$\vec{r} = (\hat{i}+2\hat{j}-\hat{k}) + \lambda(\hat{i}-\hat{j}+\hat{k})$ and $\vec{r}$

$= (2\hat{i}-\hat{j}-\hat{k}) + \mu(2\hat{i}+\hat{j}+2\hat{k})$

We know that

S.D. between the lines $\vec{r} = \vec{a}_1 + \lambda\vec{b}_1$ and $\vec{r} = \vec{a}_2 + \mu\vec{b}_2$ is given by $d = \left|\frac{(\vec{a}_2-\vec{a}_1)\cdot(\vec{b}_1\times\vec{b}_2)}{\left|\vec{b}_1\times\vec{b}_2\right|}\right|$

On comparing, we get

$\vec{a} = \hat{i}+2\hat{j}+\hat{k},\ \vec{b}_1 = \hat{i}-\hat{j}+\hat{k}$

$\vec{a}_2 = 2\hat{i}-\hat{j}-\hat{k},\ \vec{b}_2 = 2\hat{i}+\hat{j}+2\hat{k}$

$\therefore \vec{a}_2 - \vec{a}_2 = \hat{i}-3\hat{j}-2\hat{k}$

$\vec{b}_1\times\vec{b}_2 = \begin{vmatrix}\hat{i} & \hat{j} & \hat{k}\\ 1 & -1 & 1\\ 2 & 1 & 0\end{vmatrix} = -3\hat{i}+0\cdot\hat{j}$

$+3\hat{k}$

$\Rightarrow \left|\vec{b}_1\times\vec{b}_2\right| = \sqrt{(-3)^2+3^2} = 3\sqrt{2}$

$\Rightarrow (\vec{a}_2-\vec{a}_1)\cdot(\vec{b}_1\times\vec{b}_2) = 1(-3)-3(0)$

$-2(3) = -9$

$\therefore d = \left|\frac{-9}{3\sqrt{2}}\right| = \frac{3}{\sqrt{2}}$ units

Video Solution:

Q13 Text Solution:

$2x - 1 \le 3 \Rightarrow 2x \le 4 \Rightarrow x \le 2$

$3x + 1 \ge -5 \Rightarrow 3x \ge -6 \Rightarrow x \ge -2$

Hence, $x \in [-2, 2] \therefore k = 2$

Video Solution:

Q14 Text Solution:

We have given, $4x + 3 \ge 2x + 17$

$\Rightarrow \ 4x - 2x \ge 17 - 3 \ \ \Rightarrow 2x \ge 14$

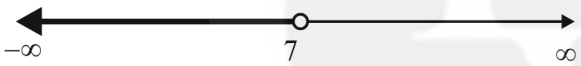
$\Rightarrow \ x \ge \frac{14}{2}$ [Dividing by 2 on both sides]

$\Rightarrow \ x \ge 7$

Also, we have 3x - 5 < -2

$\Rightarrow \ 3x < -2 + 5 \ \ \Rightarrow 3x < 3$

$\Rightarrow \ x < 1$ ...(ii)



On combining (i) and (ii), we see that solution is not possible because nothing is common between these two solutions (i.e., x < 1, $x \ge 7$).

Video Solution:

Q15 Text Solution:

$f(x) = \sqrt{\log_{1/2}\left(\frac{5x-x^2}{4}\right)}$

$\therefore \frac{5x-x^2}{4} > 0 \Rightarrow x(5-x) > 0$

$\Rightarrow x(x-5) < 0$

$\therefore x \in (0, 5) \qquad \ldots(i)$

Also $\log_{\frac{1}{2}}\left(\frac{5x-x^2}{4}\right) \ge 0$

$\Rightarrow \frac{5x-x^2}{4} \le \left(\frac{1}{2}\right)^0 \Rightarrow 5x - x^2 \le 4$

$\Rightarrow x^2 - 5x + 4 \ge 0 \Rightarrow x \in (-\infty, 1]$

$\cup [4, \infty) \qquad \ldots(ii)$

Using (i) and (ii), we get

$x \in (0, 1] \cup [4, 5)$

Video Solution:

Q16 Text Solution:

$f(x) = \frac{\log(2x-3)}{\sqrt{x-1}} + \sqrt{5-2x}$

$x - 1 > 0 \Rightarrow x > 1, 2x - 3 > 0 \Rightarrow x > \frac{3}{2}$

and $5 - 2x \ge 0 \Rightarrow x \le \frac{5}{2} \quad \therefore \frac{3}{2} < x \le \frac{5}{2}$

Hence, domain of $f(x)$ is $\left(\frac{3}{2}, \frac{5}{2}\right]$

Video Solution:

Q17 Text Solution:

Given, $f(x) = \sqrt{4-x} + \frac{1}{\sqrt{x^2-1}}$

f(x) is defined when,

$4 - x \geq 0$ and $x^2 - 1 > 0$

$\Rightarrow\ x \leq 4$ and $x^2 > 1$

$\Rightarrow\ x \leq 4$ and $x \in (-\infty,\ -1) \cup (1,\ \infty)$

$\therefore x \in (-\infty,\ -1) \cup (1,\ 4]$

Video Solution:

Q18 Text Solution:

Given $\left(\vec{a} + \lambda \vec{b}\right) \cdot \vec{c} = 0$

$\vec{a} + \lambda \vec{b} = \left(2\hat{i} + \hat{j} + \hat{k}\right) + \lambda\left(\hat{i} - \hat{j} - 4\hat{k}\right)$

$= (2+\lambda)\hat{i} + (1-\lambda)\hat{j} + (1-\lambda)\hat{k}$

$\left(\vec{a} + \lambda \vec{b}\right) \cdot \vec{c} = (2+\lambda) \cdot 1 + (1-\lambda) \cdot 1$

$+ (1-4\lambda) \cdot 1$

$0 = 2 + \lambda + 1 - \lambda + 1 - 4\lambda$

$= 4 - 4\lambda$

$4\lambda = 4$

$\lambda = 1$

Video Solution:

Q19 Text Solution:

$P = \frac{AB+AC}{2}$

$= \left(\frac{4+5}{2}\right)\hat{i} + \left(\frac{0+2}{2}\right)\hat{j} + \left(\frac{3-4}{2}\right)\hat{k}$

$= \frac{9}{2}\hat{i} + \hat{j} - \frac{1}{2}\hat{k}$

$|AP| = \sqrt{\frac{81}{4} + 1 + \frac{1}{4}}$

$|AP| = \sqrt{\frac{81+4+1}{4}} = \sqrt{\frac{86}{4}} = \sqrt{\frac{43}{2}}$

Video Solution:

Q20 Text Solution:

A binomial expansion $(ax + b)^k$ has K + 1 distinct terms.

Here K = 4n

$\Rightarrow$ 4n+1 = 13

n = 3

Video Solution:

Q21 Text Solution:

$\tan^{-1}\left[2\cos\left(2\sin^{-1}\frac{1}{2}\right)\right]$

$= \tan^{-1}\left[2\cos\left\{2\sin^{-1}\left(\sin\frac{\pi}{6}\right)\right\}\right]$

$\left(\because \sin\frac{\pi}{6} = \frac{1}{2}\right)$

$= \tan^{-1}\left[2\cos\left(2 \times \frac{\pi}{6}\right)\right] = \tan^{-1}\left[2\cos\frac{\pi}{3}\right]$

$= \tan^{-1}\left[2 \times \frac{1}{2}\right]$

$= \tan^{-1}(1) \qquad \left(\because \cos\frac{\pi}{3} = \frac{1}{2}\right)$

$= \tan^{-1}\left(\tan\frac{\pi}{4}\right)$

$= \frac{\pi}{4} \qquad \left(\because \tan\frac{\pi}{4} = 1\right)$

Video Solution:

Q22 Text Solution:

Let $\cos^{-1}\left(\frac{a}{b}\right)=\cos\theta$. Then $\cos\theta=\frac{a}{b}$

$\tan\left(\frac{\pi}{4}+\frac{\theta}{2}\right)+\tan\left(\frac{\pi}{4}-\frac{\theta}{2}\right)$

$=\frac{1+\tan\frac{\theta}{2}}{1-\tan\frac{\theta}{2}}+\frac{1-\tan\frac{\theta}{2}}{1+\tan\frac{\theta}{2}}=\frac{\left(1+\tan\frac{\theta}{2}\right)^2+\left(1-\tan\frac{\theta}{2}\right)^2}{1-\tan^2\frac{\theta}{2}}$

$=2\left(\frac{1+\tan^2\frac{\theta}{2}}{1-\tan^2\frac{\theta}{2}}\right)=\frac{2}{\cos\theta}=\frac{2b}{a}.$

Video Solution:

Q23 Text Solution:

Let $A=\tan^{-1}2,\ B=\tan^{-1}3$

We know that $A+B+C=180^{\circ}\quad\Rightarrow C$
$=180^{\circ}-A-B$

$\Rightarrow\ \tan C=\tan(180^{\circ}-A-B)=$
$-\tan(A+B)$

$=-\left[\frac{\tan A+\tan B}{1-\tan A\ \tan B}\right]=-\left[\frac{2+3}{1-6}\right]=1$

$\Rightarrow\ C=\tan^{-1}1=\frac{\pi}{4}$

Video Solution:

Q24 Text Solution:

$\sin^4\frac{\pi}{8}+\sin^4\frac{3\pi}{8}+\sin^4\frac{5\pi}{8}+\sin^4\frac{7\pi}{8}$

$=\frac{1}{4}\left[\left(2\sin^2\frac{\pi}{8}\right)^2+\left(2\sin^2\frac{3\pi}{8}\right)^2\right]$

$+\frac{1}{4}\left[\left(2\sin^2\frac{\pi}{8}\right)^2+\left(2\sin^2\frac{3\pi}{8}\right)^2\right]$

$=\frac{1}{4}\left[\left(1-\cos\frac{\pi}{4}\right)^2+\left(1-\cos\frac{3\pi}{4}\right)^2\right]$

$+\frac{1}{4}\left[\left(1-\cos\frac{\pi}{4}\right)^2+\left(1-\cos\frac{3\pi}{4}\right)^2\right]$

$=\frac{1}{4}\left[\left(1-\frac{1}{\sqrt{2}}\right)^2+\left(1+\frac{1}{\sqrt{2}}\right)^2\right]$

$+\frac{1}{4}\left[\left(1-\frac{1}{\sqrt{2}}\right)^2+\left(1+\frac{1}{\sqrt{2}}\right)^2\right]$

$=\frac{1}{4}(3)+\frac{1}{4}(3)=\frac{3}{2}$

Video Solution:

Q25 Text Solution:

$\sin 780^{\circ}\sin 480^{\circ}+\cos 120^{\circ}\sin 150^{\circ}$

$=\sin(720^{\circ}+60^{\circ})\sin(450^{\circ}+30^{\circ})$

$+\cos(180^{\circ}-60^{\circ})\sin(180^{\circ}-30^{\circ})$

$=\sin(60^{\circ})\cos(30^{\circ})-\cos(60^{\circ})\sin(30^{\circ})$

$=\frac{\sqrt{3}}{2}\frac{\sqrt{3}}{2}-\frac{1}{2}\frac{1}{2}=\frac{3}{4}-\frac{1}{4}=\frac{1}{2}$

Video Solution:

Q26 Text Solution:

$$\frac{\sin^2 x-2\cos^2 x+1}{\sin^2 x+2\cos^2 x-1}=4$$

$$\Rightarrow \sin^2 x-2\cos^2 x+1=4\sin^2 x+8\cos^2 x-4$$

$$\Rightarrow 10\cos^2 x+3\sin^2 x-5=0\Rightarrow 10+3\tan^2 x-5\left(1+\tan^2 x\right)=0$$

$$\Rightarrow 2\tan^2 x=5$$

Video Solution:

Q27 Text Solution:

$$\because\ {}^{n}C_r+{}^{n}C_{r+1}={}^{n+1}C_{r+1}$$

$${}^{16}C_3+{}^{16}C_4={}^{16+1}C_{3+1}={}^{17}C_4$$

$${}^{17}C_4+{}^{17}C_3={}^{18}C_4$$

$${}^{18}C_4+{}^{18}C_3={}^{19}C_4$$

$${}^{19}C_4+{}^{19}C_3={}^{20}C_4$$

$${}^{20}C_4+{}^{20}C_3={}^{21}C_4$$

Video Solution:

Q28 Text Solution:

$$(A\cap B)\cup(A-B)=(A\cap B)\cup(A\cap B')$$

$$=A\cap(B\cup B')=A\cap U=A$$

Video Solution:

Q29 Text Solution:

$$A=\{1,\ 2,\ 3,\ 6,\ 9,\ 18\}$$

$$B=\{1, 2, 3, 6, 8, 12, 24\}$$

$$A\cap B=\{1, 2, 3, 6\}$$

Video Solution:

Q30 Text Solution:

$$2^{n(A\times B)}=4096$$

$$2^{n(A\times B)}=2^{12}$$

$$n(A\times B)=12$$

$$n(A)\ n(B)=12$$

$$n(B)=\frac{12}{2}$$

$$n(B)=6$$

Video Solution: