

Q.1

Fill in the blank using the correct option.

14

- 1 $\log_5 125 = \underline{\hspace{2cm}}$
 (a) 5 (b) 3 (c) 2 (d) 25
- 2 $\log 81 + \log 27 = \underline{\hspace{2cm}}$
 (a) 54 (b) 3 (c) $\frac{3}{4}$ (d) $\frac{4}{3}$
- 3 $9^{\log_3 2} = \underline{\hspace{2cm}}$
 (a) 4 (b) 1 (c) 0 (d) -2
- 4 If $\begin{vmatrix} x & 1 \\ 4 & 2 \end{vmatrix} = 0$ then $x = \underline{\hspace{2cm}}$
 (a) -2 (b) 1 (c) 2 (d) 0
- 5 Order of $\begin{bmatrix} 2 & 1 & 2 \\ 1 & 1 & 1 \end{bmatrix}$ is $\underline{\hspace{2cm}}$.
 (a) 2X3 (b) 3X2 (c) 2X2 (d) none
- 6 If $A = \begin{bmatrix} 1 & 2 \\ 3 & 1 \\ 4 & 2 \end{bmatrix}$ then $A^T = \underline{\hspace{2cm}}$
 (a) A (b) $\begin{bmatrix} 1 & 3 & 4 \\ 2 & 1 & 2 \end{bmatrix}$ (c) $\begin{bmatrix} 1 & -3 & 4 \\ -2 & 1 & -2 \end{bmatrix}$ (d) $\begin{bmatrix} 2 & 1 \\ 1 & 3 \\ 2 & 4 \end{bmatrix}$
- 7 $\begin{bmatrix} 1 & 1 \\ 2 & 3 \end{bmatrix} + \begin{bmatrix} 2 & -1 \\ -1 & 1 \end{bmatrix} = \underline{\hspace{2cm}}$
 (a) $\begin{bmatrix} 2 & -1 \\ -2 & 3 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (c) $\begin{bmatrix} -1 & 2 \\ 3 & 2 \end{bmatrix}$ (d) $\begin{bmatrix} 3 & 0 \\ 1 & 4 \end{bmatrix}$
- 8 $\cos(\pi + \theta) = \underline{\hspace{2cm}}$
 (a) $\cos \theta$ (b) $\sin \theta$ (c) $-\cos \theta$ (d) $-\sin \theta$

- 9 Period of $\cos(2x+7)$ is _____
 (a) 2π (b) $2\pi+7$ (c) π (d) 4π
- 10 $\tan^{-1}x + \cot^{-1}x =$ _____
 (a) 1 (b) 0 (c) 90° (d) 45°
- 11 $\sin^2 40^\circ + \sin^2 50^\circ =$ _____
 (a) 1 (b) -1 (c) 0 (d) none
- 12 Volume of cylinder with radius 'r' and height 'h' is _____
 (a) r^2h (b) $2\pi rh$ (c) πr^2h (d) $2\pi r^2h$
- 13 Area of rectangle with length 250 cm and width 80 cm is _____ sq.m.
 (a) 20000 (b) 2 (c) 200 (d) 20
- 14 If diameter of a circle is 14 cm then area of circle is _____ sq. cm.
 (a) 28π (b) 14π (c) 196 π (d) 496 π

Q.2 (a) Attempt any TWO

06

1 Prove that $\log\left(\frac{51}{80}\right) + \log\left(\frac{44}{85}\right) - \log\left(\frac{99}{160}\right) - \log\left(\frac{8}{15}\right) = 0$

2 A circle is made from 176cm long wire. Find the area of circle.

3 Two hemisphere of radius 5cm are attached at the end of cylinder of same radius. If height of cylinder is 16cm then find the surface area of the shape

(b) Attempt any TWO

08

1 Prove that $\log_b a^2 \log_c b^2 \log_a c^2 = \frac{8}{27}$

2 Prove that $\frac{1}{\log_{ab} abc} + \frac{1}{\log_{bc} abc} + \frac{1}{\log_{ca} abc} = 2$

3 Cylindrical tank of radius 6m and height 7m is filled full of water. If the water of the tank is transferred to cuboid tank of length 12m and width 11m. What will be height of the water in cuboid tank?

Q.3 (a) Attempt any TWO

06

1 If $\begin{vmatrix} x-1 & 2 & 1 \\ x & 1 & x+1 \\ 1 & 1 & 0 \end{vmatrix} = 4$ then find x.

2 If $A = \begin{bmatrix} 1 & 2 & 1 \\ 1 & -1 & 0 \\ 3 & 2 & 1 \end{bmatrix}$, $B = \begin{bmatrix} -2 & 1 & 2 \\ 2 & -1 & 3 \\ 0 & 2 & 4 \end{bmatrix}$, $C = \begin{bmatrix} 5 & 4 & 2 \\ -1 & 7 & 8 \\ 6 & 4 & 3 \end{bmatrix}$ then find $2A-B+C$.

3 If $A = \begin{bmatrix} -1 & 2 \\ 3 & 1 \end{bmatrix}$ then prove that $A^2 - 7I = 0$

(b) Attempt any TWO

08

1 If $A = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 2 & 3 \\ 1 & 1 & 2 \end{bmatrix}$ then find A^{-1}

2 Solve the given equations using matrix method. $3x-2y=5$, $x+y=5$

- 3 If $A = \begin{bmatrix} -1 & 1 & -1 \\ 3 & -3 & 3 \\ 5 & -5 & 5 \end{bmatrix}$ then prove that $A^2 = A = 0$

Q.4 (a) Attempt any TWO

06

- 1 Simplify $\frac{\sin\left(\frac{\pi}{2} + \theta\right)}{\cos(\pi - \theta)} + \frac{\cot\left(\frac{3\pi}{2} - \theta\right)}{\tan(\pi - \theta)} + \frac{\operatorname{cosec}\left(\frac{\pi}{2} - \theta\right)}{\sec(\pi + \theta)}$
- 2 Prove that $\frac{\sin(B-C)}{\cos B \cos C} + \frac{\sin(C-A)}{\cos C \cos A} + \frac{\sin(A-B)}{\cos A \cos B} = 0$
- 3 Prove that $\tan^{-1}\left(\frac{1}{2}\right) - \tan^{-1}\left(\frac{1}{3}\right) = \tan^{-1}\left(\frac{1}{7}\right)$

(b) Attempt any TWO

08

- 1 Draw the graph of $y = \sin x$, $0 \leq x \leq \pi$
- 2 Prove that $\frac{\sin \theta + \sin 2\theta + \sin 4\theta + \sin 5\theta}{\cos \theta + \cos 2\theta + \cos 4\theta + \cos 5\theta} = \tan 3\theta$
- 3 Prove that $8\cos 20^\circ \cos 40^\circ \cos 80^\circ = 1$

Q.5 (a) Attempt any TWO

06

- 1 If $\vec{a} = (1, 2, 1)$, $\vec{b} = (1, -1, 2)$, $\vec{c} = (3, 2, -1)$ then find $|3\vec{a} + \vec{b} - 2\vec{c}|$
- 2 Find the angle between $(1, 2, 3)$ and $(-2, 3, 1)$
- 3 If $\vec{x} = (2, -1, 3)$ and $\vec{y} = (1, 2, -2)$ then find $(\vec{x} + \vec{y})(\vec{x} - \vec{y})$

(b) Attempt any TWO

08

- 1 Find unit vector perpendicular to $(3, -1, 2)$ and $(2, 1, -1)$
- 2 Forces $(3, -2, 1)$ and $(-1, -1, 2)$ are acting on a particle and moves the particle from point $(2, 2, -3)$ to $(-1, 2, 4)$. Find the work done.
- 3 If $(m, 2m, 4)$ and $(m, -3, 2)$ are perpendicular to each other then find m .
