MATHS SPECIAL ONE WORD TEST – CLASS 12-Vol-1

1. If A is a 3×3 non-singular matrix such that $AA^T = A^T A$ and $B = A^{-1}A^T$, then $BB^T =$

(1) A (2) B (3) I_3 (4) B^T

2. If $A=\begin{bmatrix}2 & 0\\1 & 5\end{bmatrix}$ and $B=\begin{bmatrix}1 & 4\\2 & 0\end{bmatrix}$ then $|\text{adj}(AB)|=$

(1) -40 (2) -80 (3) -60 (4) -20

3. If $A^T A^{-1}$ is symmetric, then $A^2 =$

(1) A^{-1} (2) $(A^T)^2$ (3) A^T (4) $(A^{-1})^2$

4. If $A=\begin{bmatrix}2 & 3\\5 & -2\end{bmatrix}$ be such that $\lambda A^{-1} = A$, then λ is

(1) 17 (2) 14 (3) 19 (4) 21

5. The augmented matrix of a system of linear equations is $\begin{bmatrix}1 & 2 & 7 & 3\\0 & 1 & 4 & 6\\0 & 0 & \lambda-7 & \mu+5\end{bmatrix}$. The system has infinitely many solutions if

(1) $\lambda=7, \mu\neq-5$ (2) $\lambda=-7, \mu=5$ (3) $\lambda\neq7, \mu\neq-5$ (4) $\lambda=7, \mu=-5$

6. The area of the triangle formed by the complex numbers $z, iz,$ and $z+iz$ in the Argand's diagram is

(1) $\frac{1}{2}|z|^2$ (2) $|z|^2$ (3) $\frac{3}{2}|z|^2$ (4) $2|z|^2$

7. If $|z|=1$, then the value of $\frac{1+z}{1+\bar{z}}$ is

(1) z (2) $\bar{z}$ (3) $\frac{1}{z}$ (4) 1

8. If z is a complex number such that $z\in\mathbb{C}\setminus\mathbb{R}$ and $z+\frac{1}{z}\in\mathbb{R}$, then $|z|$ is

(1) 0 (2) 1 (3) 2 (4) 3

9. If $(1+i)(1+2i)(1+3i)\cdots(1+ni)=x+iy$, then $2\cdot5\cdot10\cdots(1+n^2)$ is

(1) 1 (2) i (3) x^2+y^2 (4) $1+n^2$

10. If $\omega = cis\frac{2\pi}{3}$, then the number of distinct roots of $\begin{vmatrix}z+1 & \omega & \omega^2\\ \omega & z+\omega^2 & 1\\ \omega^2 & 1 & z+\omega\end{vmatrix}=0$

(1) 1 (2) 2 (3) 3 (4) 4

11. If f and g are polynomials of degrees m and n respectively, and if $h(x)=(f\circ g)(x)$, then the degree of h is

(1) mn (2) $m+n$ (3) m^n (4) n^m

12. According to the rational root theorem, which number is not possible rational zero of $4x^7+2x^4-10x^3-5$?

(1) -1 (2) $\frac{5}{4}$ (3) $\frac{4}{5}$ (4) 5

13. The polynomial x^3-kx^2+9x has three real zeros if and only if, k satisfies

(1) $|k|\le 6$ (2) $k=0$ (3) $|k|>6$ (4) $|k|\ge 6$

14. If $x^3+12x^2+10ax+1999$ definitely has a positive zero, if and only if

(1) $a\ge 0$ (2) $a>0$ (3) $a<0$ (4) $a\le 0$

15. The number of positive zeros of the polynomial $\sum_{j=0}^{n} {}^nC_r(-1)^r x^r$ is

(1) 0 (2) n (3) $<n$ (4) r

16. If $\sin^{-1}x+\sin^{-1}y=\frac{2\pi}{3}$; then $\cos^{-1}x+\cos^{-1}y$ is equal to

(1) $\frac{2\pi}{3}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{6}$ (4) π

17. If $\cot^{-1}x=\frac{2\pi}{5}$ for some $x\in R$, the value of $\tan^{-1}x$ is

(1) $-\frac{\pi}{10}$ (2) $\frac{\pi}{5}$ (3) $\frac{\pi}{10}$ (4) $-\frac{\pi}{5}$

18. $\sin^{-1}\left(\tan\frac{\pi}{4}\right)-\sin^{-1}\left(\sqrt{\frac{3}{x}}\right)=\frac{\pi}{6}$. Then x is a root of the equation

(1) $x^2-x-6=0$ (2) $x^2-x-12=0$ (3) $x^2+x-12=0$ (4) $x^2+x-6=0$

19. If $\sin^{-1}\frac{x}{5}+\operatorname{cosec}^{-1}\frac{5}{4}=\frac{\pi}{2}$, then the value of x is

(1) 4 (2) 5 (3) 2 (4) 3

20. $\sin(\tan^{-1}x), |x|<1$ is equal to

(1) $\frac{x}{\sqrt{1-x^2}}$ (2) $\frac{1}{\sqrt{1-x^2}}$ (3) $\frac{1}{\sqrt{1+x^2}}$ (4) $\frac{x}{\sqrt{1+x^2}}$

21. The eccentricity of the hyperbola whose latus rectum is 8 and conjugate axis is equal to half the distance between the foci is

(1) $\frac{4}{3}$ (2) $\frac{4}{\sqrt{3}}$ (3) $\frac{2}{\sqrt{3}}$ (4) $\frac{3}{2}$

22. The radius of the circle passing through the point $(6,2)$ two of whose diameter are $x+y=6$ and $x+2y=4$ is

(1) 10 (2) $2\sqrt{5}$ (3) 6 (4) 4

23. Area of the greatest rectangle inscribed in the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is

(1) $2ab$ (2) ab (3) $\sqrt{ab}$ (4) $\frac{a}{b}$

24. The circle passing through $(1,-2)$ and touching the axis of x at $(3,0)$ passing through the point

(1) $(-5,2)$ (2) $(2,-5)$ (3) $(5,-2)$ (4) $(-2,5)$

25. The values of m for which the line $y = mx + 2\sqrt{5}$ touches the hyperbola $16x^2 - 9y^2 = 144$ are the roots of $x^2 - (a+b)x - 4 = 0$, then the value of $(a+b)$ is

(1) 2 (2) 4 (3) 0 (4) -2

26. If $\vec{a}\cdot\vec{b} = \vec{b}\cdot\vec{c} = \vec{c}\cdot\vec{a} = 0$, then the value of $[\vec{a},\vec{b},\vec{c}]$ is

(1) $|\vec{a}|\,|\vec{b}|\,|\vec{c}|$ (2) $\frac{1}{3}|\vec{a}|\,|\vec{b}|\,|\vec{c}|$ (3) 1 (4) -1

27. If $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{b} = \hat{i} + \hat{j}$, $\vec{c} = \hat{i}$ and $(\vec{a}\times\vec{b})\times\vec{c} = \lambda\vec{a} + \mu\vec{b}$, then the value of $\lambda + \mu$ is

(1) 0 (2) 1 (3) 6 (4) 3

28. If $\vec{a} = 2\hat{i} + 3\hat{j} - \hat{k}$, $\vec{b} = \hat{i} + 2\hat{j} - 5\hat{k}$, $\vec{c} = 3\hat{i} + 5\hat{j} - \hat{k}$, then a vector perpendicular to $\vec{a}$ and lies in the plane containing $\vec{b}$ and $\vec{c}$ is

(1) $-17\hat{i} + 21\hat{j} - 97\hat{k}$ (2) $17\hat{i} + 21\hat{j} - 123\hat{k}$

(3) $-17\hat{i} - 21\hat{j} + 97\hat{k}$ (4) $-17\hat{i} - 21\hat{j} - 97\hat{k}$

29. Distance from the origin to the plane $3x - 6y + 2z + 7 = 0$ is

(1) 0 (2) 1 (3) 2 (4) 3

30. If the planes $\vec{r}.(2\hat{i} - \lambda\hat{j} + \hat{k}) = 3$ and $\vec{r}.(4\hat{i} + \hat{j} - \mu\hat{k}) = 5$ are parallel, then the value of λ and μ are

(1) $\frac{1}{2}, -2$ (2) $-\frac{1}{2}, 2$ (3) $-\frac{1}{2}, -2$ (4) $\frac{1}{2}, 2$

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MATHS SPECIAL ONE WORD TEST – CLASS 12-Vol-2

1. The volume of a sphere is increasing in volume at the rate of $3\pi \text{ cm}^3/\text{sec}$. The rate of change of its radius when radius is $\frac{1}{2}$ cm

   (1) 3 cm/s (2) 2 cm/s (3) 1 cm/s (4) $\frac{1}{2}$ cm/s

2. The tangent to the curve $y^2 - xy + 9 = 0$ is vertical when

   (1) $y = 0$ (2) $y = \pm\sqrt{3}$ (3) $y = \frac{1}{2}$ (4) $y = \pm 3$

3. The number given by the Rolle's theorem for the function $x^3 - 3x^2, x \in [0,3]$ is

   (1) 1 (2) $\sqrt{2}$ (3) $\frac{3}{2}$ (4) 2

4. The curve $y = ax^4 + bx^2$ with $ab > 0$

   (1) has no horizontal tangent (2) is concave up
   (3) is concave down (4) has no points of inflection

5. The minimum value of the function $|3 - x| + 9$ is

   (1) 0 (2) 3 (3) 6 (4) 9

6. A circular template has a radius of 10 cm. The measurement of radius has an approximate error of 0.02 cm. Then the percentage error in calculating area of this template is

   (1) 0.2% (2) 0.4% (3) 0.04% (4) 0.08%

7. If we measure the side of a cube to be 4 cm with an error of 0.1 cm, then the error in our calculation of the volume is

   (1) 0.4 cu.cm (2) 0.45 cu.cm (3) 2 cu.cm (4) 4.8 cu.cm

8. If $f(x) = \frac{x}{x+1}$, then its differential is given by

   (1) $\frac{-1}{(x+1)^2}dx$ (2) $\frac{1}{(x+1)^2}dx$ (3) $\frac{1}{x+1}dx$ (4) $\frac{-1}{x+1}dx$

9. If $w(x,y,z) = x^2(y-z) + y^2(z-x) + z^2(x-y)$, then $\frac{\partial w}{\partial x} + \frac{\partial w}{\partial y} + \frac{\partial w}{\partial z}$ is

   (1) $xy + yz + zx$ (2) $x(y + z)$ (3) $y(z + x)$ (4) 0

10. If $g(x,y) = 3x^2 - 5y + 2y^2, x(t) = e^t$ and $y(t) = \cos t$, then $\frac{dg}{dt}$ is equal to

    (1) $6e^{2t} + 5\sin t - 4\cos t \sin t$ (2) $6e^{2t} - 5\sin t + 4\cos t \sin t$
    (3) $3e^{2t} + 5\sin t + 4\cos t \sin t$ (4) $3e^{2t} - 5\sin t + 4\cos t \sin t$

11. The value of $\int_0^{\frac{2}{3}} \frac{dx}{\sqrt{4-9x^2}}$ is

    (1) $\frac{\pi}{6}$ (2) $\frac{\pi}{2}$ (3) $\frac{\pi}{4}$ (4) π

12. If $f(x)=\int_0^x t\cos t\, dt$, then $\frac{df}{dx}=$

(1) $\cos x - x\sin x$ (2) $\sin x + x\cos x$ (3) $x\cos x$ (4) $x\sin x$

13. The value of $\int_0^{\frac{\pi}{6}} \cos^3 3x\, dx$ is

(1) $\frac{2}{3}$ (2) $\frac{2}{9}$ (3) $\frac{1}{9}$ (4) $\frac{1}{3}$

14. The value of $\int_0^{\infty} e^{-3x}x^2 dx$ is

(1) $\frac{7}{27}$ (2) $\frac{5}{27}$ (3) $\frac{4}{27}$ (4) $\frac{2}{27}$

15. If $\int_0^x f(t)\,dt = x + \int_x^1 tf(t)\,dt$, then the value of $f(1)$ is

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

16. The differential equation representing the family of curves $y = A\cos(x+B)$, where A and B are parameters, is

(1) $\frac{d^2y}{dx^2} - y = 0$ (2) $\frac{d^2y}{dx^2} + y = 0$ (3) $\frac{d^2y}{dx^2} = 0$ (4) $\frac{d^2x}{dy^2} = 0$

17. The solution of the differential equation $2x\frac{dy}{dx}\quad y = 3$ represents

(1) straight lines (2) circles (3) parabola (4) ellipse

18. The solution of the differential equation $\frac{dy}{dx} + \frac{1}{\sqrt{1-x^2}} = 0$ is

(1) $y + \sin^{-1}x = c$ (2) $x + \sin^{-1}y = 0$ (3) $y^2 + 2\sin^{-1}x = C$ (4) $x^2 + 2\sin^{-1}y = 0$

19. If $\sin x$ is the integrating factor of the linear differential equation $\frac{dy}{dx} + Py = Q$, then P is

(1) $\log\sin x$ (2) $\cos x$ (3) $\tan x$ (4) $\cot x$

20. If the solution of the differential equation $\frac{dy}{dx} = \frac{ax+3}{2y+f}$ represents a circle, then the value of a is

(1) 2 (2) -2 (3) 1 (4) -1

21. Consider a game where the player tosses a six-sided fair die. If the face that comes up is 6, the player wins ₹ 36, otherwise he loses ₹k^2, where k is the face that comes up $k = \{1, 2, 3, 4, 5\}$.

The expected amount to win at this game in ₹ is

(1) $\frac{19}{6}$ (2) $-\frac{19}{6}$ (3) $\frac{3}{2}$ (4) $-\frac{3}{2}$

22. Two coins are to be flipped. The first coin will land on heads with probability 0.6, the second with Probability 0.5. Assume that the results of the flips are independent, and let X equal the total number of heads that result. The value of $E[X]$ is

(1) 0.11 (2) 1.1 (3) 11 (4) 1

23. Suppose that X takes on one of the values 0, 1, and 2. If for some constant k, $P(X=i)=k\,P(X=i-1)$ for $i=1,2$ and $P(X=0)=\frac{1}{7}$. Then the value of k is

(1) 1 (2) 2 (3) 3 (4) 4

24. If $f(x)=\begin{cases}2x & 0\le x\le a\\ 0 & \text{otherwise}\end{cases}$ is a probability density function of a random variable, then the value of a is

(1) 1 (2) 2 (3) 3 (4) 4

25. If in 6 trials, X is a binomial variate which follows the relation $9P(X=4) = P(X=2)$, then the probability of success is

(1) 0.125 (2) 0.25 (3) 0.375 (4) 0.75

26. A binary operation on a set S is a function from

(1) $S\to S$ (2) $(S\times S)\to S$ (3) $S\to(S\times S)$ (4) $(S\times S)\to(S\times S)$

27. If $a*b=\sqrt{a^2+b^2}$ on the real numbers then $*$ is

(1) commutative but not associative (2) associative but not commutative
(3) both commutative and associative (4) neither commutative nor associative

28. In the last column of the truth table for $\neg(p\vee\neg q)$ the number of final outcomes of the truth value 'F' are

(1) 1 (2) 2 (3) 3 (4) 4

29. The dual of $\neg(p\vee q)\vee[p\vee(p\wedge\neg r)]$ is

(1) $\neg(p\wedge q)\wedge[p\vee(p\wedge\neg r)]$ (2) $(p\wedge q)\wedge[p\wedge(p\vee\neg r)]$
(3) $\neg(p\wedge q)\wedge[p\wedge(p\wedge r)]$ (4) $\neg(p\wedge q)\wedge[p\wedge(p\vee\neg r)]$

30. The proposition $p\wedge(\neg p\vee q)$ is

(1) a tautology (2) a contradiction
(3) logically equivalent to $p\wedge q$ (4) logically equivalent to $p\vee q$

********** ALL THE BEST *********