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QUARTERLY EXAMINATION ONE MARK

12th Standard EM

Maths Reg.No. : | | | | | | |

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Time : 01:00:00 Hrs Total Marks : 75

A 75 x 1 = 75

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

(a) A (b) B (c) I (d) B^T

2) If A = $\begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$, B = adj A and C = 3A, then $\frac{|adjB|}{|C|}$ =

(a) $\frac{1}{3}$ (b) $\frac{1}{9}$ (c) $\frac{1}{4}$ (d) 1

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

(a) -40 (b) -80 (c) -60 (d) -20

4) If A = $\begin{bmatrix} 3 & 1 & -1 \\ 2 & -2 & 0 \\ 1 & 2 & -1 \end{bmatrix}$ and A^{-1} = $\begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$ then the value of a_{23} is

(a) 0 (b) -2 (c) -3 (d) -1

5) If A, B and C are invertible matrices of some order, then which one of the following is not true?

(a) adj A = $|A|A^{-1}$ (b) adj(AB) = (adj A)(adj B) (c) det A^{-1} = $(\det A)^{-1}$

(d) $(ABC)^{-1} = C^{-1}B^{-1}A^{-1}$

6) If A = $\begin{bmatrix} \frac{3}{5} & \frac{4}{5} \\ x & \frac{3}{5} \end{bmatrix}$ and $A^T = A^{-1}$, then the value of x is

(a) $\frac{-4}{5}$ (b) $\frac{-3}{5}$ (c) $\frac{3}{5}$ (d) $\frac{4}{5}$

7) If A = $\begin{bmatrix} 1 & \tan\frac{\theta}{2} \\ -\tan\frac{\theta}{2} & 1 \end{bmatrix}$ and AB = I , then B =

(a) $\left(\cos^2\frac{\theta}{2}\right)A$ (b) $\left(\cos^2\frac{\theta}{2}\right)A^T$ (c) $\left(\cos^2\theta\right)I$ (d) $(\sin^2\frac{\theta}{2})A$

8) If ρ(A) = ρ([A | B]), then the system AX = B of linear equations is

(a) consistent and has a unique solution (b) consistent

(c) consistent and has infinitely many solution (d) inconsistent

9) 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

(a) λ = 7, μ ≠ -5 (b) λ = 7, μ = 5 (c) λ ≠ 7, μ ≠ -5 (d) λ = 7, μ = -5

10) If A = $\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$, then adj(adj A) is

(a) $\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 6 & -6 & 8 \\ 4 & -6 & 8 \\ 0 & -2 & 2 \end{bmatrix}$ (c) $\begin{bmatrix} -3 & 3 & -4 \\ -2 & 3 & -4 \\ 0 & 1 & -1 \end{bmatrix}$ (d) $\begin{bmatrix} 3 & -3 & 4 \\ 0 & -1 & 1 \\ 2 & -3 & 4 \end{bmatrix}$

11) If A is a square matrix of order n, then |adj A| =

(a) $|A|^{n-1}$ (b) $|A|^{n-2}$ (c) $|A|^{n}$ (d) None

12) If ρ(A) = r then which of the following is correct?

(a) all the minors of order n which do not vanish

(b) 'A' has at least one minor "of order r which does not vanish and all higher order minors vanish

(c) 'A' has at least one (r + 1) order minor which vanish

(d) all (r + 1) and higher order minors should not vanish

13) The value of $\sum_{i=1}^{13}\left(i^n + i^{n-1}\right)$ is

(a) 1+ i (b) i (c) 1 (d) 0

14) The conjugate of a complex number is $\frac{1}{i-2}$. Then the complex number is

(a) $\frac{1}{i+2}$ (b) $\frac{-1}{i+2}$ (c) $\frac{-1}{i-2}$ (d) $\frac{1}{i-2}$

15) The solution of the equation |z|-z=1+2i is

(a) $\frac{3}{2} - 2i$ (b) $-\frac{3}{2} + 2i$ (c) $2 - \frac{3}{2}i$ (d) $2 + \frac{3}{2}i$

16) If z is a complex number such that $z \epsilon C/R$ and $z + \frac{1}{z} \epsilon R$ then|z| is

(a) 0 (b) 1 (c) 2 (d) 3

17) z_1, z_2 and z_3 are complex number such that $z_1+z_2+z_3=0$ and $|z_1|=|z_2|=|z_3|=1$ then $z_1^2+z_2^2+z_3^3$ is

(a) 3 (b) 2 (c) 1 (d) 0

18) If z=x+iy is a complex number such that |z+2|=|z−2|, then the locus of z is

(a) real axis (b) imaginary axis (c) ellipse (d) circle

19) The principal argument of the complex number $\frac{\left(1+i\sqrt{3}\right)^2}{4i\left(1-i\sqrt{3}\right)}$ is

(a) $\frac{2\pi}{3}$ (b) $\frac{\pi}{6}$ (c) $\frac{5\pi}{6}$ (d) $\frac{\pi}{2}$

20) If $\omega \neq 1$ is a cubic root of unity and $\begin{vmatrix} 1 & 1 & 1 \\ 1 & -\omega^2 & \omega^2 \\ 1 & \omega^2 & \omega^2 \end{vmatrix}$ =3k, then k is equal to

(a) 1 (b) -1 (c) $\sqrt{3i}$ (d) $-\sqrt{3i}$

21) The value of $\left(\frac{1+3\sqrt{i}}{1-\sqrt{3i}}\right)^{10}$

(a) $cis\frac{2\pi}{3}$ (b) $cis\frac{4\pi}{3}$ (c) $-cis\frac{2\pi}{3}$ (d) $-cis\frac{4\pi}{3}$

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

(a) 1 (b) 2 (c) 3 (d) 4

23) The value of $(1+i)(1+i^2)(1+i^3)(1+i^4)$ is

(a) 2 (b) 0 (c) 1 (d) i

24) If z=1-cosθ + i sinθ, then |z| =

(a) $2\sin\frac{1}{3}$ (b) $2\cos\frac{\theta}{2}$ (c) $2|\sin\frac{\theta}{2}|$ (d) $2|\cos\frac{\theta}{2}|$

25) If x=cosθ + i sinθ, then $x^n+\frac{1}{x^n}$ is ______

(a) 2 cos nθ (b) 2 i sin nθ (c) 2^n cosθ (d) 2^n i sinθ

26) A zero of $x^3 + 64$ is

(a) 0 (b) 4 (c) 4i (d) -4

27) If f and g are polynomials of degrees m and n respectively, and if h(x) =(f 0 g)(x), then the degree of h is

(a) mn (b) m+n (c) m^n (d) n^m

28) A polynomial equation in x of degree n always has

(a) n distinct roots (b) n real roots (c) n imaginary roots

(d) at most one root

29) If α,β and γ are the roots of x^3+px^2+qx+r, then $\Sigma\frac{1}{\alpha}$ is

(a) $-\frac{q}{r}$ (b) $\frac{p}{r}$ (c) $\frac{q}{r}$ (d) $-\frac{q}{p}$

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

(a) -1 (b) $\frac{5}{4}$ (c) $\frac{4}{5}$ (d) 5

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

(a) |k|≤6 (b) k=0 (c) |k|>6 (d) |k|≥6

32) The number of real numbers in [0,2π] satisfying $\sin^4x-2\sin^2x+1$ is

(a) 2 (b) 4 (c) 1 (d) ∞

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

(a) a≥0 (b) a>0 (c) a<0 (d) a≤0

34) The polynomial x^3+2x+3 has

(a) one negative and two real roots (b) one positive and two imaginary roots

(c) three real roots (d) no solution

35) The number of positive zeros of the polynomial $\Sigma_{j=0}^{n} n_{C_r}(-1)^r x^r$ is

(a) 0 (b) n (c) < n (d) r

36) If the root of the equation $x^3 + bx^2 + cx - 1 = 0$ form an Increasing G.P, then

(a) one of the roots is 2 (b) one of the rots is 1 (c) one of the rots is -1

(d) one of the rots is -2

37) If $p(x) = ax^2 + bx + c$ and $Q(x) = -ax^2 + dx + c$ where $ac \neq 0$ then p(x). Q(x) = 0 has at least ______ real roots.

(a) no (b) 1 (c) 2 (d) infinite

38) $sin^{-1}\frac{3}{5} - cos^{-1}\frac{12}{13} + sec^{-1}\frac{5}{3} - cosec^{1-}\frac{13}{2}$ is equal to

(a) 2π (b) π (c) 0 (d) $tan^{-1}\frac{12}{65}$

39) If $\sin^{-1}x = 2\sin^{-1}\alpha$ has a solution, then

(a) $|\alpha| \leq \frac{1}{\sqrt{2}}$ (b) $|\alpha| \geq \frac{1}{\sqrt{2}}$ (c) $|\alpha| < \frac{1}{\sqrt{2}}$ (d) $|\alpha| > \frac{1}{\sqrt{2}}$

40) If $x=\frac{1}{5}$, the valur of $\cos(\cos^{-1}x+2\sin^{-1}x)$ is

(a) $-\sqrt{\frac{24}{25}}$ (b) $\sqrt{\frac{24}{25}}$ (c) $\frac{1}{5}$ (d) $-\frac{1}{5}$

41) $tan^{-1}\left(\frac{1}{4}\right) + tan^{-1}\left(\frac{2}{3}\right)$ is equal to

(a) $\frac{1}{2}cos^{-1}\left(\frac{3}{5}\right)$ (b) $\frac{1}{2}sin^{-1}\left(\frac{3}{5}\right)$ (c) $\frac{1}{2}tan^{-1}\left(\frac{3}{5}\right)$ (d) $tan^{-1}\left(\frac{1}{2}\right)$

42) If the function $f(x)\sin^{-1}(x^2-3)$, then x belongs to

(a) [-1,1] (b) [$\sqrt{2}$,2] (c) $[-2,-\sqrt{2}] \cup [\sqrt{2},2]$ (d) $[-2,-\sqrt{2}] \cap [\sqrt{2},2]$

43) If $\cot^{-1}2$ and $\cot^{-1}3$ are two angles of a triangle, then the third angle is

(a) $\frac{\pi}{4}$ (b) $\frac{3\pi}{4}$ (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{3}$

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

(a) $x^2-x-6=0$ (b) $x^2-x-12=0$ (c) $x^2+x-12=0$ (d) $x^2+x-6=0$

45) If $|x| \leq 1$, then $2\tan^{-1}x - \sin^{-1}\frac{2x}{1+x^2}$ is equal to

(a) $\tan^{-1}x$ (b) $\sin^{-1}x$ (c) 0 (d) π

46) If $\sin^{-1}x + \cot^{-1}(\frac{1}{2}) = \frac{\pi}{2}$, then x is equal to

(a) $\frac{1}{2}$ (b) $\frac{1}{\sqrt{5}}$ (c) $\frac{2}{\sqrt{5}}$ (d) $\frac{\sqrt{3}}{2}$

47) $\sin(\tan^{-1}x)$, $|x|<1$ ia equal to

(a) $\frac{x}{\sqrt{1-x^2}}$ (b) $\frac{1}{\sqrt{1-x^2}}$ (c) $\frac{1}{\sqrt{1+x^2}}$ (d) $\frac{x}{\sqrt{1+x^2}}$

48) The number of solutions of the equation $tan^{-1}2x + tan^{-1}3x = \frac{\pi}{4}$

(a) 2 (b) 3 (c) 1 (d) none

49) If $tan^{-1}\left(\frac{x+1}{x-1}\right) + tan^{-1}\left(\frac{x-1}{x}\right) = tan^{-1}(-7)$ then x Is

(a) 0 (b) -2 (c) 1 (d) 2

50) If $cos^{-1}x > x > sin^{-1}x$ then

(a) $\frac{1}{\sqrt{2}} < x \le 1$ (b) $0 \le x < \frac{1}{\sqrt{2}}$ (c) $-1 \le x < \frac{1}{\sqrt{2}}$ (d) x>0

51) The equation of the circle passing through(1,5) and (4,1) and touching y -axis is $x^2+y^2-5x-6y+9+(4x+3y-19)=0$ whereλ is equal to

(a) $0, -\frac{40}{9}$ (b) 0 (c) $\frac{40}{9}$ (d) $\frac{-40}{9}$

52) The circle $x^2+y^2=4x+8y+5$intersects the line$3x-4y=m$ at two distinct points if

(a) 15< m < 65 (b) 35< m <85 (c) −85<m < −35 (d) −35<m <15

53) The radius of the circle$3x^2+by^2+4bx-6by+b^2=0$ is

(a) 1 (b) 3 (c) $\sqrt{10}$ (d) $\sqrt{11}$

54) The centre of the circle inscribed in a square formed by the lines $x^2-8x-12=0$ and $y^2-14y+45 = 0$ is

(a) (4,7) (b) (7,4) (c) (9,4) (d) (4,9)

55) The radius of the circle passing through the point(6,2) two of whose diameter arex+y=6 and x+2y=4 is

(a) 10 (b) $2\sqrt{5}$ (c) 6 (d) 4

56) The area of quadrilateral formed with foci of the hyperbolas $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ and $\frac{x^2}{a^2}-\frac{y^2}{b^2}=-1$

(a) $4(a^2+b^2)$ (b) $2(a^2+b^2)$ (c) a^2+b^2 (d) $\frac{1}{2}(a^2+b^2)$

57) Tangents are drawn to the hyperbola $\frac{x^2}{9}+\frac{y^2}{4}=1$parallel to the straight line$2x-y=1$. One of
the points of contact of tangents on the hyperbola is

(a) $\left(\frac{9}{2\sqrt{2}}, \frac{-1}{\sqrt{2}}\right)$ (b) $\left(\frac{-9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$ (c) $\left(\frac{9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$ (d) $\left(3\sqrt{3}, -2\sqrt{2}\right)$

58) The equation of the circle passing through the foci of the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$having centre at
(0,3) is

(a) $x^2+y^2-6y-7=0$ (b) $x^2+y^2-6y+7=0$ (c) $x^2+y^2-6y-5=0$ (d) $x^2+y^2-6y+5=0$

59) If the two tangents drawn from a point P to the parabola$y2 = 4x$are at right angles then the
locus of P is

(a) 2x+1=0 (b) x = −1 (c) 2x−1=0 (d) x =1

60) 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

(a) 2 (b) 4 (c) 0 (d) -2

61) If y = 2x + c is a tangent to the circle $x^2 + y^2 = 5$, then c is

(a) ±5 (b) $\pm\sqrt{5}$ (c) $\pm5\sqrt{2}$ (d) $\pm2\sqrt{5}$

62) In an ellipse $5x^2 + 7y^2 = 11$, the point (4, -3) lies _________ the ellipse

(a) on (b) outside (c) inside (d) none

63) 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

(a) 0 (b) 1 (c) 6 (d) 3

64) If $\vec{a}, \vec{b}, \vec{c}$ are non-coplanar, non-zero vectors such that $[\vec{a}, \vec{b}, \vec{c}] = 3$, then $\{[\vec{a} \times \vec{b}, \vec{b} \times \vec{c}, \vec{c} \times \vec{a}]\}^2$ is equal to

(a) 81 (b) 9 (c) 27 (d) 18

65) If $\vec{a}, \vec{b}, \vec{c}$ are three non-coplanar vectors such that $\vec{a} \times (\vec{b} \times \vec{c}) = \frac{\vec{b}+\vec{c}}{\sqrt{2}}$, then the angle between

(a) $\frac{\pi}{2}$ (b) $\frac{3\pi}{6}$ (c) $\frac{\pi}{4}$ (d) π

66) Consider the vectors $\vec{a}, \vec{b}, \vec{c}, \vec{c}$ such that $(\vec{a} \times \vec{b}) \times (\vec{c} \times \vec{d}) = \vec{0}$ Let P_1 and P_2 be the planes determined by the pairs of vectors $\vec{a}, \vec{b}$ and $\vec{c}, \vec{d}$ respectively. Then the angle between P_1 and P_2 is

(a) 0° (b) 45° (c) 60° (d) 90°

67) If $\vec{a} \times (\vec{b} \times \vec{c}) = (\vec{a} \times \vec{b}) \times \vec{c}$ where $\vec{a}, \vec{b}, \vec{c}$ are any three vectors such that $\vec{a}, \vec{b} \neq 0$ and $\vec{a}.\vec{b} \neq 0$ then $\vec{a}$ and $\vec{c}$ are

(a) perpendicular (b) parallel (c) inclined at an angle $\frac{\pi}{3}$

(d) inclined at an angle $\frac{\pi}{6}$

68) The angle between the lines $\frac{x-2}{3} = \frac{y+1}{-2}$, z=2 and $\frac{x-1}{1} = \frac{2y+3}{3} = \frac{z+5}{2}$

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

69) The angle between the line $\vec{r} = (\hat{i} + 2\hat{j} - 3\hat{k}) + t(2\hat{i} + \hat{j} - 2\hat{k})$ and the plane $\vec{r}.(\hat{i} + \hat{j}) + 4 = 0$ is

(a) 0° (b) 30° (c) 45° (d) 90°

70) The coordinates of the point where the line $\vec{r} = (6\hat{i} - \hat{j} - 3\hat{k}) + t(\hat{i} + 4\hat{j})$ meets the plane $\vec{r} = (\hat{i} + \hat{j} - \hat{k}) = 3$ are

(a) (2,1,0) (b) (7,1,7) (c) (1,2,6) (d) (5,1,1)

71) The distance between the planes x + 2y + 3z + 7 = 0 and 2x + 4y + 6z + 7 = 0

(a) $\frac{\sqrt{7}}{2\sqrt{2}}$ (b) $\frac{7}{2}$ (c) $\frac{\sqrt{7}}{2}$ (d) $\frac{7}{2\sqrt{2}}$

72) If the length of the perpendicular from the origin to the plane 2x + 3y + λz =1, λ > 0 is $\frac{1}{5}$ then the value of λ is

(a) $2\sqrt{3}$ (b) $3\sqrt{2}$ (c) 0 (d) 1

73) The number of vectors of unit length perpendicular to the vectors $\left(\hat{i} + \hat{j}\right)$ and $\left(\hat{j} + \hat{k}\right)$ is

(a) 1 (b) 2 (c) 3 (d) ∞

74) If $|\vec{a}| = |\vec{b}| = 1$such that $\vec{a} + 2\vec{b}$ and $5\vec{a} - \vec{b}$ are perpendicular to each other, then the angle between $\vec{a}$ and $\vec{b}$ is

(c) $\cos^{-1}\left(\frac{1}{3}\right)$ (d) $\cos^{-1}\left(\frac{2}{7}\right)$

(a) 45° (b) 60°

75) The work done by the force $\vec{F} = \hat{i} + \hat{j} + \hat{k}$ acting on a particle, if the particle is displaced from A(3, 3, 3) to the point B(4, 4, 4) is ______________ units

(a) 2 (b) 3 (c) 4 (d) 7

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