PLUS TWO/ HSC/ +2COME BOOK – ONE MARK

ENGLISH MEDIUM

MADE FOR CENTUM STUDENTS

1. MATRICES AND DETERMINANTS

(ONE QUESTION FOR FULL TEST)

TOTAL NUMBER OF QUESTIONS: 23

1. The rank of the matrix $\begin{bmatrix} 2 & -4 \\ -1 & 2 \end{bmatrix}$ is

   1.1   2.2   3.0   4. 8

2. The rank of the matrix $\begin{bmatrix} 7 & -1 \\ 2 & 1 \end{bmatrix}$ is

   1. 9   2. 2   3. 1   4. 5

3. If A and B are matrices conformable to multiplication then $(AB)^T$ is

   1. A^TB^T 2. B^TA^T 3. AB   4. BA

4. $(A^T)^{-1}$ is equal to

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

5. If $\rho(A) = r$, then which of the following is correct?

   1. all the minors of order r which do not vanish.

   2. A has atleast one minor of r which does not vanish and all higher order minors vanish.

   3. A has atleast one (r+1) order minor which vanishes.

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

6. Which of the following is not elementary transformation?

   1. $R_i \leftrightarrow R_j$ 2. $R_i \rightarrow 2R_i+R_j$ 3. $C_i \rightarrow C_j+C_i$ 4. $R_i \rightarrow R_i+C_j$

7. Equivalent matrices are obtained by

   1. taking inverses   2. taking transposes

   3. taking adjoints   4. taking finite number of elementary transformations

8. In echelon form, which of the following is incorrect?
   1. Every row of A which has all its entries 0 occurs below every row which has a non-zero entry.
   2. The first non-zero entry in each non-zero row is 1.
   3. The number of zeros before the first non-zero element in a row is less than the number of such zeros in the next row.
   4. Two rows can have same number of zeros before the first non-zero entry

9. If $\Delta \neq 0$ then the system is
   1. consistent and has unique solution
   2. consistent and has infinitely many solutions
   3. inconsistent
   4. either consistent or inconsistent

10. In the system of 3 linear equations with three unknowns, if $\Delta = 0$ and one of $\Delta_x, \Delta_y, or\, \Delta_z$ is non-zero then the system is
    1. consistent
    2. inconsistent
    3. consistent and the system reduces to two equations
    4. consistent and the system reduces to a single equation.

11. In the system of 3 linear equations with three unknowns, if $\Delta = 0$, $\Delta_x = 0$, $\Delta_y = 0, \Delta_z = 0$ and atleast one 2x2 minor of $\Delta \neq 0$ then the system is
    1. consistent
    2. inconsistent
    3. consistent and the system reduces to two equations
    4. consistent and the system reduces to a single equation.

12. In the system of 3 linear equations with three unknowns, if $\Delta = 0$ and all 2x2 minors of $\Delta = 0$ and atleast one of 2x2 minor of Δ_x *or* Δ_y *or* Δ_z is non-zero then the system is
    1. consistent
    2. inconsistent
    3. consistent and the system reduces to two equations
    4. consistent and the system reduces to a single equation.

13. In the system of 3 linear equations with three unknowns, if $\Delta = 0$ and all 2x2 minors of $\Delta, \Delta_x, \Delta_y, \Delta_z$ are zeros and atleast one non-zero element is in Δ then the system is

1. consistent
2. inconsistent
3. consistent and the system reduces to two equations
4. consistent and the system reduces to a single equation.

14. Every homogeneous system(linear)

1. is always consistent
2. has only trivial solution
3. has infinitely many solution
4. need not be consistent

15. If $\rho(A) = \rho[A, B]$ then the system is

1. consistent and has infinitely many solution
2. consistent and has a unique solution
3. consistent
4. inconsistent

16. If $\rho(A) = \rho[A, B]$ = the number of unknowns then the system is

1. consistent and has infinitely many solution
2. consistent and has a unique solution
3. consistent
4. inconsistent

17. $\rho(A) \neq \rho[A, B]$ then the system is

1. consistent and has infinitely many solution
2. consistent and has a unique solution
3. consistent
4. inconsistent

18. In the system of 3 linear equations with three unknowns, $\rho(A) = \rho[A, B] = 1$, then the system

1.has unique solution

2. reduces to 2 equations and has infinitely many solutions

3. reduces to a single equations and has infinitely many solutions

4. is inconsistent

19. In the homogeneous system with three unknowns, $\rho(A)$ = number of unknowns then the system has

1. only trivial solution

2. reduces to 2 equations and has infinitely many solutions

3. reduces to a single equations and has infinitely many solutions

4. is inconsistent

20. In the system of three linear equations with three unknowns, in the non-homogeneous system $\rho(A) = \rho[A, B] = 2$, then the system

1. has unique solution

2. reduces to two equations and has infinitely many solutions

3. reduces to a single equations and has infinitely many solutions

4. is inconsistent

21. In the homogeneous system $\rho(A) <$ the number of unknowns then the system has

1. only trivial solution

2. trivial solution and infinitely many non-trivial solutions

3. only non-trivial solutions

4. no solution

22. Cramer's rule is applicable only (with three unknowns) when

1. $\Delta \neq 0$ 2. $\Delta = 0$ 3. $\Delta = 0, \Delta_x \neq 0$ 4. $\Delta_x = \Delta_y = \Delta_z = 0$

23. Which of the following statement is correct regarding homogeneous system

1. always consistent

2. has only trivial solution

3. has only non-trivial solutions

4. has only trivial solution only if rank of the coefficient matrix is equal to the number of unknowns

2. VECTOR ALGEBRA

(TWO QUESTION FOR FULL TEST)

TOTAL NUMBER OF QUESTIONS: 39

1. The value of $\vec{a}\cdot\vec{b}$ when $\vec{a}=\vec{i}-2\vec{j}+\vec{k}$ and $\vec{b}=4\vec{i}-4\vec{j}+7\vec{k}$ is

   1. 19 2. 3 3. -19 4. 14

2. The value of $\vec{a}\cdot\vec{b}$ when $\vec{a}=\vec{j}+2\vec{k}$ and $\vec{b}=2\vec{i}+\vec{k}$ is

   1. 2 2. -2 3. 3 4. 4

3. The value of $\vec{a}\cdot\vec{b}$ when $\vec{a}=\vec{j}-2\vec{k}$ and $\vec{b}=2\vec{i}+3\vec{j}-2\vec{k}$ is

   1. 7 2. -7 3. 5 4.6

4. If $m\vec{i}+2\vec{j}+\vec{k}$ and $4\vec{i}-9\vec{j}+2\vec{k}$ are perpendicular, then m is

   1.-4 2. 8 3. 4 4. 12

5. If $5\vec{i}-9\vec{j}+2\vec{k}$ and $m\vec{i}+2\vec{j}+\vec{k}$ are perpendicular, then m is

   1. $\frac{5}{16}$ 2. $-\frac{5}{16}$ 3. $\frac{16}{5}$ 4. $-\frac{16}{5}$

6. If $\vec{a}$ and $\vec{b}$ are two vectors such that $|\vec{a}|=4$, $|\vec{b}|=3$ and $\vec{a}\cdot\vec{b}=6$, then the angle between $\vec{a}$ and $\vec{b}$ is

   1. $\frac{\pi}{6}$ 2. $-\frac{\pi}{6}$ 3. $-\frac{\pi}{3}$ 4. $\frac{\pi}{3}$

7. The angle between the vectors $3\vec{i}-2\vec{j}-6\vec{k}$ and $4\vec{i}-\vec{j}+8\vec{k}$ is

   1. $\cos^{-1}\left(\frac{34}{63}\right)$ 2. $\sin^{-1}\left(-\frac{34}{63}\right)$ 3. $\sin^{-1}\left(\frac{34}{63}\right)$ 4. $\cos^{-1}\left(-\frac{34}{63}\right)$

8. The angle between the vectors $\vec{i}-\vec{j}$ and $\vec{j}-\vec{k}$ is

   1. $\frac{\pi}{3}$ 2. $-\frac{2\pi}{3}$ 3. $-\frac{\pi}{3}$ 4. $\frac{2\pi}{3}$

9. The projection of the vector $7\vec{i}+\vec{j}-4\vec{k}$ on $2\vec{i}+6\vec{j}+3\vec{k}$ is

   1. $\frac{7}{8}$ 2. $\frac{8}{\sqrt{66}}$ 3. $\frac{8}{7}$ 4. $\frac{\sqrt{66}}{8}$

10. $\vec{a}\cdot\vec{b}$ when $\vec{a} = 2\vec{i}+2\vec{j}-\vec{k}$ and $\vec{b} = 6\vec{i}-3\vec{j}+2\vec{k}$ is

1. 4 2. -4 3. 3 4. 5

11. If the vectors $2\vec{i}+\lambda\vec{j}+\vec{k}$ and $\vec{i}-2\vec{j}+\vec{k}$ are perpendicular to each other, then λ is

1. $\frac{2}{3}$ 2. $\frac{-2}{3}$ 3. $\frac{3}{2}$ 4. $\frac{-3}{2}$

12. If the vectors $\vec{a}=3\vec{i}+2\vec{j}+9\vec{k}$ and $\vec{b}=\vec{i}+m\vec{j}+3\vec{k}$ are perpendicular, then 'm' is

1. -15 2. 15 3. 30 4. -30

13. If the vectors $\vec{a}=3\vec{i}+2\vec{j}+9\vec{k}$ and $\vec{b}=\vec{i}+m\vec{j}+3\vec{k}$ are parallel, then 'm' is

1. $\frac{3}{2}$ 2. $\frac{2}{3}$ 3. $\frac{-3}{2}$ 4. $\frac{-2}{3}$

14. If $\vec{a}$, $\vec{b}$, $\vec{c}$ are mutually perpendicular unit vectors, then $\left|\vec{a}+\vec{b}+\vec{c}\right| =$

1. 3 2. 9 3. $3\sqrt{3}$ 4. $\sqrt{3}$

15. If $|\vec{a}+\vec{b}|=60$, $|\vec{a}-\vec{b}|=40$ and $|\vec{b}|=46$, then $|\vec{a}|$ is

1. 22 2. 21 3. 18 4. 11

16. Let $\vec{u}$, $\vec{v}$ and $\vec{w}$ be vector such that $\vec{u}+\vec{v}+\vec{w}=\vec{0}$. If $|\vec{u}|=3$, $|\vec{v}|=4$ and $|\vec{w}|=5$, then

$\vec{u}\cdot\vec{v}+\vec{v}\cdot\vec{w}+\vec{w}\cdot\vec{u}$ is

1. 25 2. -25 3. 5 4. $\sqrt{5}$

17. The projection of $\vec{i}-\vec{j}$ on z-axis is

1. 0 2. 1 3. -1 4. 2

18. The projection of $\vec{i}+2\vec{j}-2\vec{k}$ on $2\vec{i}-\vec{j}+5\vec{k}$ is

1. $\frac{-10}{\sqrt{30}}$ 2. $\frac{10}{\sqrt{30}}$ 3. $\frac{1}{3}$ 4. $\frac{\sqrt{10}}{30}$

19. The projection of $3\vec{i}+\vec{j}-\vec{k}$ on $4\vec{i}-\vec{j}+2\vec{k}$ is

1. $\frac{9}{\sqrt{21}}$ 2. $-\frac{9}{\sqrt{21}}$ 3. $\frac{81}{\sqrt{21}}$ 4. $-\frac{81}{\sqrt{21}}$

20. The work done in a moving particle from the point A with position vector $2\vec{i}-6\vec{j}+7\vec{k}$ to the point B, with position vector $3\vec{i}-\vec{j}-5\vec{k}$ by a force $\vec{F} = \vec{i}+3\vec{j}-\vec{k}$ is

1. 25 2. 26 3. 27 4. 28

21. The work done by the force $\vec{F} = a\vec{i} + \vec{j} + \vec{k}$ in moving the point of application from (1, 1, 1) to (2, 2, 2) along a straight line is given to be 5 units. The value of a is

1. -3 2. 3 3. 8 4. -8

22. If $|\vec{a}|=3$, $|\vec{b}| = 4$ and $\vec{a}\cdot\vec{b}=9$, then $|\vec{a}\times\vec{b}|$ is

1. $3\sqrt{7}$ 2. 63 3. 69 4. $\sqrt{69}$

23. The angle between the two vectors $\vec{a}$ and $\vec{b}$ if $|\vec{a}\times\vec{b}| = \vec{a}\cdot\vec{b}$ is

1. $\frac{\pi}{4}$ 2. $\frac{\pi}{3}$ 3. $\frac{\pi}{6}$ 4. $\frac{\pi}{2}$

24. If $|\vec{a}| =2$, $|\vec{b}| =7$ and $\vec{a}\times\vec{b} = 3\vec{i} - 2\vec{j} + 6\vec{k}$ then the angle between $\vec{a}$ and $\vec{b}$ is

1. $\frac{\pi}{4}$ 2. $\frac{\pi}{3}$ 3. $\frac{\pi}{6}$ 4. $\frac{\pi}{2}$

25. The direction cosines of a vector whose direction ratios are 2, 3, -6 are

1. $\left(\frac{2}{7}, \frac{3}{7}, \frac{-6}{7}\right)$ 2. $\left(\frac{2}{49}, \frac{3}{49}, \frac{-6}{49}\right)$

3. $\left(\frac{\sqrt{2}}{7}, \frac{\sqrt{3}}{7}, \frac{-\sqrt{6}}{7}\right)$ 4. $\left(\frac{2}{7}, \frac{3}{7}, \frac{6}{7}\right)$

26. The unit normal vectors to the plane $2x - y + 2z = 5$ are

1. $2\vec{i} - \vec{j} + 2\vec{k}$ 2. $\frac{1}{3}\left(2\vec{i} - \vec{j} + 2\vec{k}\right)$

3. $-\frac{1}{3}\left(2\vec{i} - \vec{j} + 2\vec{k}\right)$ 4. $\pm\frac{1}{3}\left(2\vec{i} - \vec{j} + 2\vec{k}\right)$

27. The length of the perpendicular from the origin to the plane $\vec{r}\cdot\left(3\vec{i} + 4\vec{j} + 12\vec{k}\right) = 26$ is

1. 26 2. $\frac{26}{169}$ 3. 2 4. $\frac{1}{2}$

28. The distance from the origin to the plane $\vec{r}\cdot\left(2\vec{i} - \vec{j} + 5\vec{k}\right) = 7$ is

1. $\frac{7}{\sqrt{30}}$ 2. $\frac{\sqrt{30}}{7}$ 3. $\frac{30}{7}$ 4. $\frac{7}{30}$

29. Chord AB is a diameter of the sphere $\left|\vec{r} - \left(2\vec{i} + \vec{j} - 6\vec{k}\right)\right| = \sqrt{18}$ with coordinate of A as (3, 2, -2). Then the coordinates of B is

1. (1, 0, 10) 2. (-1, 0, -10) 3. (-1, 0, 10) 4. (1, 0, -10)

30. The centre and radius of the sphere $\left|\vec{r}-(2\vec{i}-\vec{j}+4\vec{k})\right|=5$ are

1. (2, -1, 4) and 5 2. (2, 1, 4) and 5 3. (-2, 1, 4) and 6 4. (2, 1, -4) and 5

31. The centre and radius of the sphere $\left|2\vec{r}+(3\vec{i}-\vec{j}+4\vec{k})\right|=4$ are

1. $\left(-\frac{3}{2},\frac{1}{2},-2\right)$, 4 2. $\left(-\frac{3}{2},\frac{1}{2},-2\right)$ and 2

3. $\left(-\frac{3}{2},\frac{1}{2},-2\right)$, 6 4. $\left(-\frac{3}{2},\frac{1}{2},-2\right)$ and 5

32. The vector equation of a plane passing through a point whose position vector is $\vec{a}$ and perpendicular to a vector $\vec{n}$ is

1. $\vec{r}\cdot\vec{n}=\vec{a}\cdot\vec{n}$ 2. $\vec{r}\times\vec{n}=\vec{a}\times\vec{n}$ 3. $\vec{r}+\vec{n}=\vec{a}+\vec{n}$ 4. $\vec{r}-\vec{n}=\vec{a}-\vec{n}$

33. The vector equation of a plane whose distance from the origin is p and perpendicular to a unit vector $\hat{n}$ is

1. $\vec{r}\,.\,\vec{n}=p$ 2. $\vec{r}\,.\,\hat{n}=q$ 3. $\vec{r}\times\vec{n}=p$ 4. $\vec{r}\,.\,\hat{n}=p$

34. The non-parametric vector equation of a plane passing through a point whose position vector is $\vec{a}$ and parallel to $\vec{u}$ and $\vec{v}$ is

1. $[\vec{r}-\vec{a},\ \vec{u},\ \vec{v}]=0$ 2. $[\vec{r}\ \ \vec{u}\ \ \vec{v}]=0$

3. $[\vec{r}\ \ \vec{a}\ \ \vec{u}\times\vec{v}]=0$ 4. $[\vec{a}\ \ \vec{u}\ \ \vec{v}]=0$

35. The non-parametric vector equation of a plane passing through the points whose position vectors are $\vec{a}\,.\,\vec{b}$ and parallel to $\vec{v}$ is

1. $\left|\vec{r}-\vec{a}\quad \vec{b}-\vec{a}\quad \vec{v}\right|=0$ 2. $\left|\vec{r}\quad \vec{b}-\vec{a}\quad \vec{v}\right|=0$

3. $\left|\vec{a}\quad \vec{b}\quad \vec{v}\right|=0$ 4. $\left|\vec{r}\quad \vec{a}\quad \vec{b}\right|=0$

36. The non-parametric vector equation of a plane passing through three non-collinear points whose position vectors are $\vec{a},\vec{b},\vec{c}$ is

1. $\left|\vec{r}-\vec{a}\quad \vec{b}-\vec{a}\quad \vec{c}-\vec{a}\right|=0$ 2. $\left|\vec{r}\quad \vec{a}\quad \vec{b}\right|=0$

3. $\left|\vec{r}\quad \vec{b}\quad \vec{c}\right|=0$ 4. $\left|\vec{a}\quad \vec{b}\quad \vec{c}\right|=0$

37. The vector equation of a plane passing through the line of intersection of the planes $\vec{r}\,.\,\vec{n}_1=q_1$ and $\vec{r}\,.\,\vec{n}_2=q_2$ is

1. $(\vec{r}\,.\,\vec{n}_1-q_1)+\lambda\,(\vec{r}\,.\,\vec{n}_2-q_2)=0$ 2. $\vec{r}.\vec{n}_1+\vec{r}.\vec{n}_2=q_1+\lambda\,q_2$

3. $\vec{r}\times\vec{n}_1+\vec{r}\times\vec{n}_2=q_1+q_2$ 4. $\vec{r}\times\vec{n}_1-\vec{r}\times n_2=q_1+q_2$

38. The angle between the line $\vec{r}=\vec{a}+t\vec{b}$ and the plane $\vec{r}\cdot\vec{n}=q$ is connected by the relation

1. $\cos\theta=\frac{\vec{a}\cdot\vec{n}}{q}$ 2. $\cos\theta=\frac{\vec{b}\cdot\vec{n}}{|\vec{b}||\vec{n}|}$ 3. $\sin\theta=\frac{\vec{a}\cdot\vec{b}}{|\vec{n}|}$ 4. $\sin\theta=\frac{\vec{b}\cdot\vec{n}}{|\vec{b}||\vec{n}|}$

39. The vector equation of a sphere whose centre is origin and radius 'a' is

1. $r=\vec{a}$ 2. $\vec{r}-\vec{c}=\vec{a}$ 3. $|\vec{r}|=|\vec{a}|$ 4. $\vec{r}=a$

3. COMPLEX NUMBERS

(ONE QUESTION FOR FULL TEST)

TOTAL NUMBER OF QUESTIONS: 46

1. The complex number form of $\sqrt{-35}$ is

   1. $i\sqrt{35}$ 2. $-i\sqrt{35}$ 3. $i\sqrt{-35}$ 4. 35i

2. The complex number form of $3-\sqrt{-7}$ is

   1. $-3+i\sqrt{-7}$ 2. $3-i\sqrt{-7}$ 3. 3- i7 4. 3+ i7

3. Real and imaginary parts of $4-i\sqrt{3}$ are

   1. $4, \sqrt{3}$ 2. $4, -\sqrt{3}$ 3. $-\sqrt{3}, 4$ 4. $\sqrt{3}, 4$

4. Real and imaginary parts of $\frac{3}{2}i$ are

   1. $0, \frac{3}{2}$ 2. $\frac{3}{2}, 0$ 3. 2, 3 4. 3. 2

5. The complex conjugate of $2+i\sqrt{7}$ is

   1. $-2+i\sqrt{7}$ 2. $-2-i\sqrt{7}$ 3. $2-i\sqrt{7}$ 4. $2+i\sqrt{7}$

6. The complex conjugate of $-4-i9$ is

   1. $-4+i9$ 2. $4+i9$ 3. 4 – i9 4. – 4 – i9

7. The complex conjugate of $\sqrt{5}$ is

   1. $\sqrt{5}$ 2. $-\sqrt{5}$ 3. $i\sqrt{5}$ 4. $-i\sqrt{5}$

8. The standard form $(a+ib)$ of $3+2i+(-7-i)$ is

   1. $4-i$ 2. $-4+i$ 3. $4+i$ 4. $4+4i$

9. If $a+ib = (8-6i)-(2i-7)$ then the values of 'a' and 'b' are

   1. 8, –15 2. 8, 15 3. 15, 9 4. 15, – 8

10. If p+iq = (2-3i)(4+2i), then q is

    1. 14 2. -14 3. -8 4. 8

11. The conjugate of (2+i)(3-2i) is

    1. 8-i 2. -8-i 3. -8+i 4. 8+i

12. The real and imaginary parts of (2+i)(3-2i) are

    1. -1, 8 2. -8, 1 3. 8, -1 4. -8, -1

13. The modulus values of -2+2i and 2-3i are

1. $\sqrt{5}, 5$ 2. $2\sqrt{5}, \sqrt{13}$ 3. $2\sqrt{2}, \sqrt{13}$ 4. - 4, 1

14. The modulus values of -3-2i and 4+3i are

1. 5. 5 2. $\sqrt{5}, 7$ 3. $\sqrt{6}, 1$ 4. $\sqrt{13}, 5$

15. The cube roots of unity are

1. in G.P. with common ratio ω,

2. in G.P. with common difference ω^2

3. In A.P. with common difference ω

4. in A.P. with common difference with ω^2

16. The arguments of n^{th} roots of a complex number differ by

1. $\frac{2\pi}{n}$ 2. $\frac{\pi}{n}$ 3. $\frac{3\pi}{n}$ 4. $\frac{4\pi}{n}$

17. Which of the following statements is correct?

1. negative complex numbers exist

2. order relation does not exist in real numbers

3. order relation exist in complex numbers

4. $(1+i) > (3-2i)$ is meaningless

18. Which of the following are correct?

a. $\text{Re}(z) \le |z|$ b. $Im(z) \ge |z|$ c. $|\overline{z}| = |z|$ d. $\overline{(z^n)} = (\overline{z})^n$

1. (a), (b) 2. (b), (c) 3. (b), (c) and (d) 4. (a), (c) and (d)

19. The values of $\overline{\overline{z}} + \overline{z}$ is

1. $2\ \text{Re}(z)$ 2. $\text{Re}(z)$ 3. $\text{Im}(z)$ 4. $2\ \text{Im}(z)$

20. The value of $z - \overline{z}$ is

1. $2\ \text{Im}(z)$ 2. $2i\ \text{Im}(z)$ 3. $Im(z)$ 4. $i\,\text{Im}(z)$

21. The value of $z\overline{z}$ is

1. $|z|$ 2. $|z|^2$ 3. $2|z|$ 4. $2|z|^2$

22. If $|z-z_1| = |z-z_2|$ then the locus of z is

1. a circle with centre at the origin

2. a circle with centre at z_1

3. a straight line passing through the origin

4. is a perpendicular bisector of the line joining z_1 and z_2

23. If ω is a cube roots of unity, then

1. $\omega^2 = 1$ 2. $1+\omega = 0$ 3. $1+\omega+\omega^2 = 0$ 4. $1-\omega+\omega^2 = 0$

24. The principal value of $\arg z$ lies in the interval

1. $\left[0, \frac{\pi}{2}\right]$ 2. $(-\pi, \pi]$ 3. $[0, \pi]$ 4. $(-\pi, 0]$

25. If z_1 and z_2 are any two complex numbers then which one of the following is false?

1. $\text{Re}(z_1+z_2) = \text{Re}(z_1) + \text{Re}(z_2)$

2. $\text{Im}(z_1+z_2) = I_m(z_1) + I_m(z_2)$

3. $\arg(z_1+z_2) = \arg z_1 + \arg z_2$

4. $|z_1 z_2| = |z_1| |z_2|$

26. The fourth roots of unity are

1. $1 \pm i, -1 \pm i$ 2. $\pm i, 1 \pm i$ 3. $\pm 1, \pm i$ 4. $1, -1$

27. The fourth roots of unity form the vertices of

1. an equilateral triangle 2. a square

3. a hexagon 4. a rectangle

28. Cube roots of unity are

1. $1, \frac{-1 \pm i\sqrt{3}}{2}$ 2. $i, -1 \pm \frac{i\sqrt{3}}{2}$

3. $1, \frac{1 \pm i\sqrt{3}}{2}$ 4. $i, \frac{1 \pm i\sqrt{3}}{2}$

29. The number of values of $(\cos\theta + i\sin\theta)^{\frac{p}{q}}$ where p and q are non-zero integers prime to each other, is

1. p 2. q 3. p+q 4. p-q

30. The value of $e^{i\theta} + e^{-i\theta}$ is

1. $2\cos\theta$ 2. $\cos\theta$ 3. $2\sin\theta$ 4. $\sin\theta$

31. The value of $e^{i\theta} - e^{-i\theta}$ is

1. $\sin\theta$ 2. $2\sin\theta$ 3. $i\sin\theta$ 4. $2i\sin\theta$

32. Geometrical interpretation of $\bar{z}$ is

1. reflection of z on real axis
2. reflection of z on imaginary axis
3. rotation of z about origin
4. rotation of z about origin through $\pi/2$ in clockwise direction

33. If $z_1 = a + ib,\ z_2 = -a + ib$ then $z_1 - z_2$ lies on

1. real axis 2. imaginary axis 3. the line y= x 4. the line y = -x

34. Which one of the following is incorrect?

1. $(\cos\theta + i\sin\theta)^n = \cos n\theta + i\sin n\theta$
2. $(\cos\theta - i\sin\theta)^n = \cos n\theta - i\sin n\theta$
3. $(\sin\theta + i\cos\theta)^n = \sin n\theta + i\cos n\theta$
4. $\dfrac{1}{\cos\theta + i\sin\theta} = \cos\theta - i\sin\theta$

35. Polynomial equation P(x)=0 admits conjugate pairs of imaginary roots only if the coefficients are

1. imaginary 2. complex 3. real 4. either real or complex

36. Identify the correct statement

1. Sum of the moduli of two complex numbers is equal to their modulus of the sum
2. Modulus of the product of the complex numbers is equal to the sum of their moduli
3. Arguments of the product of two complex numbers is the product of their arguments.
4. Arguments of the product of two complex numbers is equal to sum of their arguments.

37. Which of the following is not true?

1. $\overline{z_1 + z_2} = \overline{z_1} + \overline{z_2}$ 2. $\overline{z_1 z_2} = \overline{z_1}\ \overline{z_2}$

3. $\text{Re}(z) = \dfrac{\bar{z} + z}{2}$ 4. $\text{Im}(z) = \dfrac{\bar{z} - z}{2i}$

38. If z_1 and z_2 are complex numbers then which of the following is meaningful?

1. $z_1 < z_2$ 2. $z_1 > z_2$ 3. $z_1 \geq z_2$ 4. $z_1 \neq z_2$

39. Which of the following is incorrect?

1. $\text{Re}(z) \leq |z|$ 2. $\text{Im}(z) \leq |z|$ 3. $z\bar{z} = |z|^2$ 4. $\text{Re}(z) \geq |z|$

40. Which of the following is incorrect?

1. $|z_1 + z_2| \leq |z_1| + |z_2|$ 2. $|z_1 - z_2| \leq |z_1| + |z_2|$

3. $|z_1 - z_2| \geq |z_1| - |z_2|$ 4. $|z_1 + z_2| \geq |z_1| + |z_2|$

41. Which of the following is incorrect?

1. $\bar{z}$ is the mirror image of z on the real axis

2. The polar form of $\bar{z}$ is $(r, -\theta)$

3. –z is the point symmetrical to z about the origin

4. The polar form of -z is $(-r, -\theta)$

42. Which of the following is incorrect?

1. Multiplying a complex number by i is equivalent to rotating the number counter clockwise about the origin through an angle 90°.

2. Multiplying a complex number by $-i$ is equivalent to rotating the number clockwise about the origin through an angle 90°.

3. Dividing a complex number by i is equivalent to rotating the number counter clockwise about the origin through an angle 90°.

4. Dividing a complex number by i is equivalent to rotating the number clockwise about the origin through an angle 90°.

43. Which of the following is incorrect regarding nth roots of unity?

1. The number of distinct roots is n

2. the roots are in G.P. with common ratio $cis\frac{2\pi}{n}$

3. the arguments are in A.P. with common difference $\frac{2\pi}{n}$.

4. product of the roots is 0 and the sum of the roots is ± 1.

44. Which of the following are true?

1. If n is a positive integer then $(\cos\theta + i\sin\theta)^n = \cos n\theta + i\sin n\theta$

2. If n is a negative integer then $(\cos\theta + i\sin\theta)^n = \cos n\theta - i\sin n\theta$

3. If n is a fraction then $\cos n\theta + i\sin n\theta$ is one of the values of $(\cos n\theta + i\sin\theta)^n$.

4. If n is a negative integer then $(\cos\theta + i\sin\theta)^n = \cos n\theta + i\sin n\theta$

1. (i), (ii), (iii), (iv) 2. (i), (iii), (iv) 3. (i), (iv) 4. (i) only

45. If $O(0,0)$, $A(Z_1)$, $B(Z_2)$, $B'(-Z_2)$ are the complex numbers in a argand plane then which of the following are correct?

(i) In the parallelogram OACB, represents $Z_1 + Z_2$

(ii) In the argand plane E represents $Z_1 Z_2$ where OE = OA.OB and OE makes an angle arg(z_1)+arg(z_2) with positive real axis.

(iii) In the argand parallelogram $OB'DA$, D represents $Z_1 - Z_2$

(iv) In the argand plane F represents $\frac{Z_1}{Z_2}$ where $OF = \frac{OA}{OB}$ and OF makes an angle arg(z_1)-arg(z_2) with positive real axis.

1. (i), (ii), (iii), (iv) 2. (i), (iii), (iv)

3. (i), (iv) 4. (i) only

46. If Z = 0, then the arg(Z) is

1. 0 2. π 3. $\frac{\pi}{2}$ 4. indeterminate

4. ANALYTICAL GEOMETRY

(ONE QUESTION FOR FULL TEST)

TOTAL NUMBER OF QUESTIONS: 92

1. The axis of the parabola $y^2 = 4x$ is

   1. $x = 0$ 2. $y = 0$ 3. $x = 1$ 4. $y = 1$

2. The vertex of the parabola $y^2 = 4x$ is

   1. (1,0) 2. (0, 1) 3. (0, 0) 4. (0, −1)

3. The focus of the parabola $y^2 = 4x$ is

   1. (0,1) 2. (1, 1) 3. (0, 0) 4. (0, 0)

4. The directrix of the parabola $y^2 = 4x$ is

   1. $y = -1$ 2. $x = -1$ 3. $y = 1$ 4. $x = 1$

5. The equation of the latus rectum of $y^2 = 4x$ is

   1. $x = 1$ 2. $y = 1$ 3. $x = 4$ 4. $y = -1$

6. The length of the latus rectum of $y^2 = 4x$ is

   1. 2 2. 3 3. 1 4. 4

7. The axis of the parabola $x^2 = -4y$ is

   1. $y = 1$ 2. $x = 0$ 3. $y = 0$ 4. $x = 1$

8. The vertex of the parabola $x^2 = -4y$ is

   1. (0,1) 2. (0, −1) 3. (1, 0) 4. (0, 0)

9. The focus of the parabola $x^2 = -4y$ is

   1. (0, 0) 2. (0, −1) 3. (0, 1) 4. (1, 0)

10. The directrix of the parabola $x^2 = -4y$ is

    1. $x = 1$ 2. $x = 0$ 3. $y = 1$ 4. $y = 0$

11. The equation of the latus rectum of $x^2 = -4y$ is

    1. $x = -1$ 2. $y = -1$ 3. $x = 1$ 4. $y = 1$

12. The length of the latus rectum of $x^2 = -4y$ is

    1. 1 2. 2 3. 3 4. 4

13. The axis of the parabola $y^2 = -8x$ is

1. $x = 0$ 2. $x = 2$ 3. $y = 2$ 4. $y = 0$

14. The vertex of the parabola $y^2 = -8x$ is

1. (0, 0) 2. (2, 0) 3. (0, – 2) 4. (2, – 2)

15. The focus of the parabola $y^2 = -8x$ is

1. (0, – 2) 2. (0, 2) 3. (–2, 0) 4. (2, 0)

16. The equation of the directrix of the parabola $y^2 = -8x$ is

1. $y + 2 = 0$ 2. $x - 2 = 0$ 3. $y - 2 = 0$ 4. $x + 2 = 0$

17. The equation of the latus rectum of $y^2 = -8x$ is

1. $y - 2 = 0$ 2. $y + 2 = 0$ 3. $x - 2 = 0$ 4. $x + 2 = 0$

18. The length of the latus rectum of $y^2 = -8x$ is

1. 8 2. 6 3. 4 4. - 8

19. The axis of the parabola $x^2 = 20y$ is

1. $y = 5$ 2. $x = 5$ 3. $x = 0$ 4. $y = 0$

20. The vertex of the parabola $x^2 = 20y$ is

1. (0,5) 2. (0, 0) 3. (5, 0) 4. (0, – 5)

21. The focus of the parabola $x^2 = 20y$ is

1. (0, 0) 2. (5, 0) 3. (0,5) 4. (–5, 0)

22. The equation of the directrix of the parabola $x^2 = 20y$ is

1. $y - 5 = 0$ 2. $x + 5 = 0$ 3. $x - 5 = 0$ 4. $y + 5 = 0$

23. The equation of the latus rectum of the parabola $x^2 = 20y$ is

1. $x - 5 = 0$ 2. $y - 5 = 0$ 3. $y + 5 = 0$ 4. $x + 5 = 0$

24. The length of the latus rectum of the parabola $x^2 = 20y$ is

1. 20 2. 10 3. 5 4. 4

25. If the centre of the ellipse is (2, 3) one of the foci is (3, 3) then the other focus is

1. (1, 3) 2. (–1, 3) 3. (1, –3) 4. (–1, –3)

26. The equation of the major and minor axes of $\frac{x^2}{9} + \frac{y^2}{4} = 1$ are

1. $x = 3, y = 2$ 2. $x = -3, y = -2$ 3. $x = 0, y = 0$ 4. $y = 0, x = 0$

27. The equation of the major and minor axes of $4x^2 + 3y^2 = 12$ are

1. $x = \sqrt{3}, y=2$ 2. $x = 0, y = 0$ 3. $x=-\sqrt{3}, y=-2$ 4. $y = 0, x = 0$

28. The length of the minor and major axes of $\frac{x^2}{9} + \frac{y^2}{4} = 1$ are

1. 6, 4 2. 3, 2 3. 4, 6 4. 2, 3

29. The length of the major and minor axes of $4x^2 + 3y^2 = 12$ are

1. $4, 2\sqrt{3}$ 2. $2, \sqrt{3}$ 3. $2\sqrt{3}, 4$ 4. $\sqrt{3}, 2$

30. The equation of the directrices $\frac{x^2}{16} + \frac{y^2}{9} = 1$ are

1. $y = \pm\frac{4}{\sqrt{7}}$ 2. $x = \pm\frac{16}{\sqrt{7}}$ 3. $x = \pm\frac{16}{7}$ 4. $y = \pm\frac{16}{\sqrt{7}}$

31. The equation of the directrices $25x^2+9y^2 = 225$ are

1. $x=\pm\frac{4}{25}$ 2. $x=\pm\frac{25}{4}$ 3. $y=\pm\frac{4}{25}$ 4. $y=\pm\frac{25}{4}$

32. The equation of the latus rectum of $\frac{x^2}{16} + \frac{y^2}{9} = 1$ are

1. $y = \pm\sqrt{7}$ 2. $x = \pm\sqrt{7}$ 3. $x = \pm 7$ 4. $y = \pm 7$

33. The equation of the latus rectum of $25x^2 + 9y^2 = 225$ are

1. $y = \pm 5$ 2. $x = \pm 5$ 3. $y = \pm 4$ 4. $x = \pm 4$

34. The length of the latus rectum of $\frac{x^2}{16} + \frac{y^2}{9} = 1$ are

1. $\frac{9}{2}$ 2. $\frac{2}{9}$ 3. $\frac{9}{16}$ 4. $\frac{16}{9}$

35. The length of the latus rectum of $25x^2 + 9y^2 = 225$ are

1. $\frac{9}{5}$ 2. $\frac{18}{5}$ 3. $\frac{25}{9}$ 4. $\frac{5}{18}$

36. The eccentricity of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$ is

1. $\frac{1}{5}$ 2. $\frac{3}{5}$ 3. $\frac{2}{5}$ 4. $\frac{4}{5}$

37. The eccentricity of the ellipse $\frac{x^2}{4} + \frac{y^2}{9} = 1$ is

1. $\frac{\sqrt{5}}{3}$ 2. $\frac{\sqrt{3}}{5}$ 3. $\frac{3}{5}$ 4. $\frac{2}{3}$

38. The eccentricity of the ellipse $16x^2+25y^2= 400$ is

1. $\frac{4}{5}$ 2. $\frac{3}{5}$ 3. $\frac{3}{4}$ 4. $\frac{2}{5}$

39. The centre of the ellipse $\frac{x^2}{25}+\frac{y^2}{9}=1$ is

1. (0, 0) 2. (5, 0) 3. (3, 5) 4. (0, 5)

40. The centre of the ellipse $\frac{x^2}{4}+\frac{y^2}{9}=1$ is

1. (0, 3) 2. (2, 3) 3. (0, 0) 4. (3, 0)

41. The foci of the ellipse $\frac{x^2}{25}+\frac{y^2}{9}=1$ are

1. $(0, \pm 5)$ 2. $(0, \pm 4)$ 3. $(\pm 5, 0)$ 4. $(\pm 4, 0)$

42. The foci of the ellipse $\frac{x^2}{4}+\frac{y^2}{9}=1$ are

1. $(\pm 5, 0)$ 2. $(0, \pm\sqrt{5})$ 3. $(0, \pm 5)$ 4. $(\pm\sqrt{5}, 0)$

43. The foci of the ellipse $16x^2+25y^2= 400$ are

1. $(\pm 3, 0)$ 2. $(0, \pm 3)$ 3. $(0, \pm 5)$ 4. $(\pm 5, 0)$

44. The vertices of the ellipse $\frac{x^2}{25}+\frac{y^2}{9}=1$ are

1. $(0, \pm 5)$ 2. $(0, \pm 3)$ 3. $(\pm 5, 0)$ 4. $(\pm 3, 0)$

45. The vertices of the ellipse $\frac{x^2}{4}+\frac{y^2}{9}=1$ are

1. $(0, \pm 3)$ 2. $(\pm 2, 0)$ 3. $(\pm 3, 0)$ 4. $(0, \pm 2)$

46. The vertices of the ellipse $16x^2+25y^2= 400$ are

1. $(0, \pm 4)$ 2. $(\pm 5, 0)$ 3. $(\pm 4, 0)$ 4. $(0, \pm 5)$

47. If the centre of the ellipse is (4, -2) and one of the foci is (4, 2), then the other focus is

1. (4, 6) 2. (6, −4) 3. (4, −6) 4. (6, 4)

48. The equations of transverse and conjugate axes of the hyperbola $\frac{x^2}{9}-\frac{y^2}{4}=1$ are

1. $x = 2\,;\, y = 3$ 2. $y = 0\,;\, x = 0$ 3. $x = 3\,;\, y = 2$ 4. $x = 0,\ y = 0$

49. The equations of transverse and conjugate axes of the hyperbola $16y^2 - 9x^2 = 144$ are

1. $y = 0\,;\, x = 0$ 2. $x = 3\,;\, y = 4$ 3. $x = 0\,;\, y = 0$ 4. $y = 3\,;\, x = 4$

50. The equations of transverse and conjugate axes of the hyperbola $144x^2 - 25y^2 = 3600$ are

1. $y = 0\,;\, x = 0$ 2. $x = 12\,;\, y = 5$ 3. $x = 0\,;\, y = 0$ 4. $x = 5\,;\, y = 12$

51. The equations of transverse and conjugate axes of the hyperbola $8y^2-2x^2 = 16$ are

1. $x=2\sqrt{2}\,;\, y=\sqrt{2}$ 2. $x=\sqrt{2}\,;\, y=2\sqrt{2}$

3. $x = 0\,;\, y = 0$ 4. $y = 0\,;\, x = 0$

52. The equation of the directrices of the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ are

1. $y = \pm\frac{9}{\sqrt{13}}$ 2. $x = \pm\frac{13}{9}$ 3. $y = \pm\frac{\sqrt{13}}{9}$ 4. $x = \pm\frac{9}{\sqrt{13}}$

53. The equation of the directrices of the hyperbola $16y^2 - 9x^2 = 144$ are

1. $x = \pm\frac{5}{9}$ 2. $y = \pm\frac{9}{5}$ 3. $x = \pm\frac{9}{5}$ 4. $y = \pm\frac{5}{9}$

54. The equation of the latus rectum of the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ are

1. $y = \pm 13$ 2. $y = \pm\sqrt{13}$ 3. $x = \pm 13$ 4. $x = \pm\sqrt{13}$

55. The equation of the latus rectum of the hyperbola $16y^2 - 9x^2 = 144$ are

1. $y = \pm 5$ 2. $x = \pm 5$ 3. $y = \pm\sqrt{5}$ 4. $x = \pm\sqrt{5}$

56. The length of the latus rectum of the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ are

1. $\frac{4}{3}$ 2. $\frac{8}{3}$ 3. $\frac{3}{2}$ 4. $\frac{9}{4}$

57. The eccentricity of the hyperbola $\frac{y^2}{9} - \frac{x^2}{25} = 1$ are

1. $\frac{34}{3}$ 2. $\frac{5}{3}$ 3. $\frac{\sqrt{34}}{3}$ 4. $\frac{\sqrt{34}}{5}$

58. The centre of the hyperbola $25x^2 - 16y^2 = 400$ are

1. (0, 4) 2. (0, 5) 3. (4, 5) 4. (0, 0)

59. The foci of the hyperbola $\frac{y^2}{9} - \frac{x^2}{25} = 1$ are

1. $(0, \pm\sqrt{34})$ 2. $(\pm 34, 0)$ 3. $(0, \pm 34)$ 4. $(\pm\sqrt{34}, 0)$

60. The vertices of the hyperbola $25x^2 - 16y^2 = 400$ are

1. $(0, \pm 4)$ 2. $(\pm 4, 0)$ 3. $(0, \pm 5)$ 4. $(\pm 5, 0)$

61. The equation of the tangent at (3, -6) to the parabola $y^2 = 12x$ is

1. $x - y - 3 = 0$ 2. $x + y - 3 = 0$

3. $x - y + 3 = 0$ 4. $x + y + 3 = 0$

62. The equation of the tangent at (-3, 1) to the parabola $x^2 = 9y$ is

1. $3x - 2y - 3 = 0$ 2. $2x - 3y + 3 = 0$

3. $2x + 3y + 3 = 0$ 4. $3x + 2y + 3 = 0$

63. The equation of chord of contact of tangents from the point (-3, 1) to the parabola $y^2 = 8x$ is

1. $4x - y - 12 = 0$ 2. $4x + y + 12 = 0$

3. $4y - x - 12 = 0$ 4. $4y + x + 12 = 0$

64. The equation of chord of contact of tangents from the point (2, 4) to the ellipse $2x^2 + 5y^2 = 20$ is

1. $x - 5y + 5 = 0$ 2. $5x - y + 5 = 0$

3. $x + 5y - 5 = 0$ 4. $5y - y - 5 = 0$

65. The equation of chord of contact of tangents from the point (5, 3) to the hyperbola $4x^2 - 6y^2 = 24$ is

1. $9x + 10y + 12 = 0$ 2. $10x + 9y - 12 = 0$

3. $9x - 10y + 12 = 0$ 4. $10x - 9y - 12 = 0$

66. The combined equation of the asymptotes to the hyperbola $36x^2 - 25y^2 = 900$ is

1. $25x^2 + 36x^2 = 0$ 2. $36x^2 - 25y^2 = 0$

3. $36x^2 + 25y^2 = 0$ 4. $25x^2 - 36y^2 = 0$

67. The angle between the asymptotes of the hyperbola $24x^2 - 8y^2 = 27$ is

1. $\frac{\pi}{3}$ 2. $\frac{\pi}{3}$ or $\frac{2\pi}{3}$ 3. $\frac{2\pi}{3}$ 4. $\frac{-2\pi}{3}$

68. The point of contact of the tangent $y = mx + c$ and the parabola $y^2 = 4ax$ is

1. $\left(\frac{a}{m^2}, \frac{2a}{m}\right)$ 2. $\left(\frac{2a}{m^2}, \frac{a}{m}\right)$ 3. $\left(\frac{a}{m}, \frac{2a}{m^2}\right)$ 4. $\left(\frac{-a}{m^2}, \frac{-2a}{m}\right)$

69. The point of contact of the tangent $y = mx + c$ and the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is

1. $\left(\frac{b^2}{c}, \frac{a^2m}{c}\right)$ 2. $\left(\frac{-a^2m}{c}, \frac{b^2}{c}\right)$ 3. $\left(\frac{a^2m}{c}, \frac{-b^2}{c}\right)$ 4. $\left(\frac{-a^2m}{c}, \frac{-b^2}{c}\right)$

70. The point of contact of the tangent $y = mx + c$ and the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is

1. $\left(\frac{am^2}{c}, \frac{b^2}{c}\right)$ 2. $\left(\frac{a^2m}{c}, \frac{b^2}{c}\right)$ 3. $\left(\frac{-a^2m}{c}, \frac{-b^2}{c}\right)$ 4. $\left(\frac{-am^2}{c}, \frac{-b^2}{c}\right)$

71. The true statements of the following are

a. Two tangents and 3 normals can be drawn to a parabola from a point.

b. Two tangents and 4 normals can be drawn to an ellipse from a point.

c. Two tangents and 4 normals can be drawn to a hyperbola from a point.

d. Two tangents and 4 normals can be drawn to a rectangular hyperbola from a point.

1. a, b, c and d 2. a, b only 3. c, d only 4. a, b and c

72. If $'t_1'$, $'t_2'$ are the extremities of any focal chord of a parabola $y^2 = 4ax$ then ; $t_1 t_2$ is

1. -1 2. 0 3. ± 1 4. $\frac{1}{2}$

73. The normal at $'t_1'$ on the parabola $y^2 = 4ax$ meets the parabola at $'t_2'$ then $\left(t_1 + \frac{2}{t_1}\right)$ is

1. $-t_2$ 2. t_2 3. $t_1 + t_2$ 4. $\frac{1}{t_2}$

74. The condition that the line $lx + my + n = 0$ may be a normal to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is

1. $al^3 + 2alm^2 + m^2n = 0$ 2. $\frac{a^2}{l^2} + \frac{b^2}{m^2} = \frac{(a^2 + b^2)^2}{n^2}$

3. $\frac{a^2}{l^2} + \frac{b^2}{m^2} = \frac{(a^2 - b^2)^2}{n^2}$ 4. $\frac{a^2}{l^2} - \frac{b^2}{m^2} = \frac{(a^2 + b^2)^2}{n^2}$

75. The condition that the line $lx + my + n = 0$ may be a normal to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is

1. $al^3 + 2alm^2 + m^2n = 0$ 2. $\frac{a^2}{l^2} + \frac{b^2}{m^2} = \frac{(a^2 + b^2)^2}{n^2}$

3. $\frac{a^2}{l^2} + \frac{b^2}{m^2} = \frac{(a^2 - b^2)^2}{n^2}$ 4. $\frac{a^2}{l^2} - \frac{b^2}{m^2} = \frac{(a^2 + b^2)^2}{n^2}$

76. The condition that the line $lx + my + n = 0$ may be a normal to the parabola $y^2 = 4ax$ is

1. $al^3 + 2alm^2 + m^2n = 0$ 2. $\frac{a^2}{l^2} + \frac{b^2}{m^2} = \frac{(a^2 + b^2)^2}{n^2}$

3. $\frac{a^2}{l^2} + \frac{b^2}{m^2} = \frac{(a^2 - b^2)^2}{n^2}$ 4. $\frac{a^2}{l^2} - \frac{b^2}{m^2} = \frac{(a^2 + b^2)^2}{n^2}$

77. The chord of contact of tangents from any point on the directrix of the parabola $y^2 = 4ax$ passes through its

1. vertex 2. focus 3. directrix 4. latus rectum

78. The chord of contact of tangents from any point on the directrix of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ passes through its

1. vertex 2. focus 3. directrix 4. latus rectum

79. The chord of contact of tangents from any point on the directrix of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ passes through its

1. vertex 2. focus 3. directrix 4. latus rectum

80. The point of intersection of tangents at 't_1' and 't_2' to the parabola $y^2 = 4ax$ is

1. $(a(t_1 + t_2),\ at_1t_2)$ 2. $(at_1t_2,\ a(t_1 + t_2))$

3. $(at^2,\ 2at)$ 4. $(at_1t_2,\ a(t_1 - t_2))$

81. If the normal to the R.H. $xy = c^2$ at 't_1' meets the curve aagain at 't_2' then $t_1^3t_2 =$

1. 1 2/ 0 3. -1 4. -2

82. The locus of the point of intersection of perpendicular tangents to the parabola $y^2 = 4ax$ is

1. latus rectum 2. directrix

3. tangent at the vertex 4. axis of the parabola

83. The locus of the foot of perpendicular from the focus on any tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is

1. $x^2 + y^2 = a^2 - b^2$ 2. $x^2 + y^2 = a^2$

3. $x^2 + y^2 = a^2 + b^2$ 4. $x = 0$

84. The locus of the foot of perpendicular from the focus on any tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is

1. $x^2 + y^2 = a^2 - b^2$ 2. $x^2 + y^2 = a^2$

3. $x^2 + y^2 = a^2 + b^2$ 4. $x = 0$

85. The locus of the foot of perpendicular from the focus on any tangent to the parabola $y^2 = 4ax$ is

1. $x^2 + y^2 = a^2 - b^2$ 2. $x^2 + y^2 = a^2$

3. $x^2 + y^2 = a^2 + b^2$ 4. $x = 0$

86. The locus of the point of intersection of perpendicular tangents to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is

1. $x^2 + y^2 = a^2 - b^2$ 2. $x^2 + y^2 = a^2$

3. $x^2 + y^2 = a^2 + b^2$ 4. $x = 0$

87. The locus of the point of intersection of perpendicular tangents to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is

1. $x^2 + y^2 = a^2 - b^2$ 2. $x^2 + y^2 = a^2$

3. $x^2 + y^2 = a^2 + b^2$ 4. $x = 0$

88. The condition that the line $lx + my + n = 0$ may be a tangent to the parabola $y^2 = 4ax$ is

1. $a^2l^2 + b^2m^2 = n^2$ 2. $am^2 = \ln$

3. $a^2l^2 - b^2m^2 = n^2$ 4. $4c^2lm = n^2$

89. The condition that the line $lx + my + n = 0$ may be a tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is

1. $a^2l^2 + b^2m^2 = n^2$ 2. $am^2 = \ln$

3. $a^2l^2 - b^2m^2 = n^2$ 4. $4c^2lm = n^2$

90. The condition that the line $lx + my + n = 0$ may be a tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is

1. $a^2l^2 + b^2m^2 = n^2$ 2. $am^2 = \ln$

3. $a^2l^2 - b^2m^2 = n^2$ 4. $4c^2lm = n^2$

91. The condition that the line $lx + my + n = 0$ may be a tangent to the rectangular hyperbola $xy = c^2$ is

1. $a^2l^2 + b^2m^2 = n^2$ 2. $am^2 = \ln$

3. $a^2l^2 - b^2m^2 = n^2$ 4. $4c^2lm = n^2$

92. The foot of a perpendicular from a focus of the hyperbola on an asymptote lies on the

1. centre 2. corresponding directrix 3. vertex 4. L.R.

5. DIFFERENTIAL CALCULUS- APPLICATIONS-I

(ONE QUESTION FOR FULL TEST)

TOTAL NUMBER OF QUESTIONS: 40

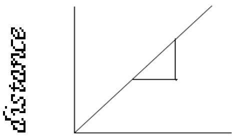
1. Let 'h' be the height of the tank. Then the rate of change of pressure 'p' of the tank with respect to height is

   1. $\frac{dh}{dt}$ 2. $\frac{dp}{dt}$ 3. $\frac{dh}{dp}$ 4. $\frac{dp}{dh}$

2. If the temperature $\theta^\circ C$ of the certain metal rod of 'l' metres is given by $l = 1 + 0.000050\theta + 0.00000004\theta^2$ then the rate of change of 'l' in m/C° when the temperature is $100^\circ C$ is

   1. 0.00013 m/C° 2. 0.00023 m/C° 3. 0.00026 m/C° 4. 0.00033 m/C°

3. The following graph gives the functional relationship between distance and time of a moving car in *m/sec*. The speed of the car is



   1. $\frac{x}{t} m/s$ 2. $\frac{t}{x} m/s$ 3. $\frac{dx}{dt} m/s$ 4. $\frac{dt}{dx} m/s$

4. The distance-time relationship of a moving body is given by $y = F(t)$, then the acceleration of the body is the

   1. gradient of the velocity/time graph
   2. gradient of the distance/time graph
   3. gradient of the acceleration/time graph
   4. gradient of the velocity/distance graph

5. The distance traveled by a car in 't' seconds is given by $x = 3t^3 - 2t^2 + 4t - 1$. Then the initial velocity and initial acceleration respectively are

   1. (-4m/s, 4m/s^2) 2. (4m/s, -4m/s^2)
   3. (0, 0) 4. (18.25m/s, 23m/s^2)

6. The angular displacement of a fly wheel in radians is given by $\theta = 9t^2 - 2t^3$. The time when the angular acceleration zero is

1. 2.5s 2. 3.5s 3. 1.5s 4. 4.5s

7. Food pockets were dropped from an helicopter during the flood and distance fallen in 't' seconds is given by $y = \frac{1}{2}gt^2$ (g = 9.8 m/ s^2). Then the speed of the food pocket after it has fallen for '2' seconds is

1. 19.6 m/sec 2. 9.8 m/sec 3. -19.6 m/sec 4. -9.8 m/sec

8. An object dropped from the sky follows the law of motion $x = \frac{1}{2}gt^2$ (g = 9.8 m/ s^2). The acceleration of the object when $t = 2$ is

1. -9.8 m/sec^2 2. 9.8 m/sec^2 3. 19.6 m/sec^2 4. -19.6 m/sec^2

9. A missile fired from ground level rises x metres vertically upwards in 't' seconds and $x = t(100-12.5t)$. Then the maximum height reached by the missile is

1. 100m 2. 150 m 3. 250 m 4. 200 m

10. A continuous graph $y = f(x)$ is such that $f'(x) \to \infty$ as $x \to x_1$ at (x_1, y_1). Then $y = f(x)$ has a

1. vertical tangent y = x_1 2. horizontal tangent x = x_1

3. vertical tangent x = x_1 4. horizontal tangent y = y_1

11. The curve $y = f(x)$ and $y = g(x)$ cut orthogonally if at the point of intersection

1. slope of f(x) = slope of g(x)

2. slope of f(x) + slope of g(x) = 0

3.. slope of f(x) / slope of g(x) = -1

4. [slope of f(x)][slope of g(x)] = -1

12. The law of the mean can also be put in the form

1. $f(a+h) = f(a) - hf'(a+\theta h), \quad 0<\theta<1$

2. $f(a+h) = f(a) + hf'(a+\theta h), \quad 0<\theta<1$

3. $f(a+h) = f(a) + hf'(a-\theta h), \quad 0<\theta<1$

4. $f(a+h) = f(a) - hf'(a-\theta h), \quad 0<\theta<1$

13. $l'H\hat{o}pital's$ rule cannot be applied to $\frac{x+1}{x+3}$ as $x \to 0$ because f(x) = x+1 and g(x) = x+3 are

1. not continuous 2. not differentiable

3. not in the indeterminate form as $x \to 0$

4. in the indeterminate form as $x \to 0$

14. If $\lim_{x \to a} g(x) = b$ and f is continuous at $x = b$ then

1. $\lim_{x \to a} g(f(x)) = f\left[\lim_{x \to a} g(x)\right]$ 2. $\lim_{x \to a} f(g(x)) = f\left[\lim_{x \to a} g(x)\right]$

3. $\lim_{x \to a} f(g(x)) = g\left[\lim_{x \to a} f(x)\right]$ 4. $\lim_{x \to a} f(g(x)) \neq f\left[\lim_{x \to a} g(x)\right]$

15. $\lim_{x \to 0} \frac{x}{\tan x}$ is

1. 1 2. -1 3. 0 4. ∞

16. f is a real valued function defined on an interval $I \subset R$ (R being the set of real numbers) increases on I. Then

1. $f(x_1) \le f(x_2)$ whenever $x_1 < x_2,\ if\ x_1, x_2 \in I$

2. $f(x_1) \ge f(x_2)$ whenever $x_1 < x_2,\ if\ x_1, x_2 \in I$

3. $f(x_1) \le f(x_2)$ whenever $x_1 > x_2,\ if\ x_1, x_2 \in I$

4. $f(x_1) > f(x_2)$ whenever $x_1 > x_2,\ if\ x_1, x_2 \in I$

17. If a real valued differentiable function $y = f(x)$ defined on an open interval I is increasing then

1. $\frac{dy}{dx} > 0$ 2. $\frac{dy}{dx} \ge 0$ 3. $\frac{dy}{dx} < 0$ 4. $\frac{dy}{dx} \le 0$

18. f is differentiable function defined on an interval I with positive derivative. Then f is

1. increasing on I 2. decreasing on I

3. strictly increasing on I 4. strictly decreasing on I

19. The function $f(x) = x^3$ is

1. increasing 2. decreasing 3. strictly decreasing 4. strictly increasing

20. If the gradient of a curve changes from positive just before P to negative just after then "P" is a

1. minimum point 2. maximum point 3. inflection point 4. discontinuous point

21. The function $f(x) = x^2$ has

1. a maximum value at $x=0$ 2. minimum value at $x=0$

3. finite no. of maximum values 4. infinite no. of maximum values

22. The function $f(x) = x^3$ has

1. absolute maximum 2. absolute minimum
3. local maximum 4. no extrema

23. If f has a local extremum at $\boldsymbol{a}$ and if $f'(a)$ exists then

1. $f'(a)<0$ 2. $f'(a)>0$ 3. $f'(a)=0$ 4. $f''(a)=0$

24. In the following figure,
the curve $y = f(x)$ is

1. concave upward
2. convex upward
3. changes from cancavity to convexity
4. changes from convexity and concavity

25. The point that separates the convex part of a continuous curve from the concave part is

1. the maximum point 2. the minimum point
3. the inflection point 4. critical point

26. f is a twice differentiable function on an interval I and if $f''(x) > 0$ for all x in the domain I of f, then f is

1. concave upward 2.convex upward
3. increasing 4. decreasing

27. $x = x_0$ is a root of even order for the equation $f'(x) = 0$, then $x = x_0$ is a

1. maximum point 2. minimum point
3. inflection point 4. critical point

28. If x_0 is the x-coordinate of the point of inflection of a curve $y = f(x)$, then (second derivative exists)

1. $f(x_0)=0$ 2. $f'(x_0)=0$ 3. $f''(x_0)=0$ 4. $f''(x_0)\neq 0$

29. The statement "If f is continuous on a closed interval [a, b], then f attains an absolute maximum value $f(c)$ and an absolute minimum value $f(d)$ at some number c and d in [a, b] " is

1. The extreme value theorem 2. Fermat's theorem
3. Law of mean 4. Rolle's theorem

30. The statement: " If f has a local extremum (minimum or maximum) at c and if $f'(c)$ exists then $f'(c)=0$ " is

1. the extreme value theorem
2. Fermat's theorem
3. Law of mean
4. Rolle's theorem

31. Identify the false statement:

1. all the stationary numbers are critical numbers
2. at the stationary point the first derivative is zero
3. at critical numbers the first derivative need not exist
4. all the critical numbers are stationary numbers

32. Identify the correct statement:

a. a continuous function has local maximum then it has absolute maximum
b. a continuous function has local minimum then it has absolute minimum
c. a continuous function has absolute maximum then it has local maximum
d. a continuous function has absolute minimum then it has local minimum

1. a and b 2. a and c 3. c and d 4. a, c and d

33. Identify the correct statements:

a. Every constant function is an increasing function
b. Every constant function is a decreasing function
c. Every identity function is an increasing function
d. Every identity function is a decreasing function

1. a, b and c 2. a and c 3. c and d 4. a, c and d

34. Which of the following statement is incorrect?

1. Initial velocity means velocity at t = 0
2. Initial acceleration means acceleration at t = 0
3. If the motion is upward, at the maximum height, the velocity is not zero
4. If the motion is horizontal, v = 0 when the particle comes to rest

35. Which of the following statements are correct (m_1 and m_2 are slopes of two lines)

a. If the two lines are perpendicular then $m_1 m_2 = -1$
b. If $m_1 m_2 = -1$, then two lines are perpendicular
c. If $m_1 = m_2$, then the two lines are parallel
d. If $m_1 = \frac{1}{m_2}$ then the two lines are perpendicular

1. b, c and d 2. a, b and d 3. c and b 4. a and b

36. One of the conditions of Rolle's theorem is

1. f is defined and continuous on (a, b)

2. f is differentiable on [a, b]

3. $f(a) = f(b)$

4. f is differentiable on $(a, b]$

37. If 'a' and 'b' are two roots of a polynomial $f(x)=0$, then Rolle's theorem says that there exists atleast

1.one root between a and b for $f'(x)=0$

2. two roots between a and b for $f'(x)=0$

3. one root between a and b for $f''(x)=0$

4. two roots between a and b for $f''(x)=0$

38. A real valued function which is continuous on [a, b] and differentiable on (a, b) then there exists atleast one c in

1. [a, b] such that $f'(c)=0$ 2. (a, b) such that $f'(c)=0$

3. (a, b) such that $\frac{f(b)-f(a)}{b-a}=0$ 4. (a, b) such that $\frac{f(b)-f(a)}{b-a}=f'(c)$

39. In the law of mean, the value 'θ' satisfies the condition

1. $\theta > 0$ 2. $\theta < 0$ 3. $\theta < 1$ 4. $0 < \theta < 1$

40. Which of the statements are correct?

a. Rolle's theorem is a particular case of Lagranges law of mean

b. Lagranges law of mean is a particular case of generalized law of mean(Cauchy)

c. Lagranges law of mean is a particular case of Rolle's theorem

d. Generalised law of mean is a particular case of Lagrange's law of mean (Cauchy)

1. b, c 2. c, d 3. a, b 4. a, d

6. DIFFERENTIAL CALCULUS- APPLICATIONS-II

(* QUESTION FOR FULL TEST)**

TOTAL NUMBER OF QUESTIONS: 45

1. For the function $y=x^3+2x^2$ the value of dy when x=2 and dx = 0.1 is

   1. 1 2. 2 3. 3 4. 4

2. For the function $y=x^3+2x^2$ and x=2 and dx = 0.1, dy =

   1. 2 2. 1 3. 0.2 4. 1

3. If $u=f(x,y)$ then with usual notations, $u_{xy}=u_{yx}$ if

   1. u is continuous 2. u_x is continuous

   3. u_y is continuous 4. u, u_x, u_y are continuous

4. If $u=f(x,y)$ is a differentiable function of x and y ; x and y are differentiable functions of 't' then

   1. $\frac{du}{dt}=\frac{\partial f}{\partial x}.\frac{\partial x}{\partial t}+\frac{\partial f}{\partial y}.\frac{\partial y}{\partial t}$ 2. $\frac{du}{dt}=\frac{\partial f}{\partial x}.\frac{dx}{dt}+\frac{\partial t}{\partial y}.\frac{\partial y}{\partial t}$

   3. $\frac{du}{dt}=\frac{\partial f}{\partial x}.\frac{dx}{dt}+\frac{\partial f}{\partial y}.\frac{\partial y}{\partial t}$ 4. $\frac{\partial u}{\partial t}=\frac{\partial f}{\partial x}.\frac{\partial x}{\partial t}+\frac{\partial f}{\partial y}.\frac{\partial y}{\partial t}$

5. If $f(x, y)$ is a homogeneous functions of degree n then $x\frac{\partial f}{\partial x}+y\frac{\partial f}{\partial y}=$

   1. f 2. nf 3. $n(n-1)f$ 4. $n(n+1)f$

6. If $u(x, y) = x^4+y^3+3x^2y^2+3x^2y$ then $\frac{\partial^2 u}{\partial x\partial y}$ is

   1. $12xy+6x$ 2. $12xy-6x$ 3. $12x^2y-6x$ 4. $12xy^2-6x$

7. If $u(x, y) = x^4+y^3+3x^2y^2+3x^2y$ then $\frac{\partial^2 u}{\partial y\partial x}=$

   1. $12xy+6x$ 2. $12xy-6x$ 3. $12x^2y-6x$ 4. $12xy^2-6x$

8. If $u(x, y) = x^4+y^3+3x^2y^2+3x^2y$ then $\frac{\partial^2 u}{\partial x^2}=$

   1. $3y^2+6x^2y+3x^2$ 2. $6y+6x^2$

   3. $12x^2y-6x$ 4. $12x^2+6y^2+6y$

9. If $u(x, y) = x^4 + y^3 + 3x^2y^2 + 3x^2y$ then $\frac{\partial^2 u}{\partial y^2} =$

1. $6y + 6x^2$ 2. $12xy - 6x$

3. $12x^2y - 6x$ 4. $3y^2 + 6x^2y + 3x^2$

10. The differential on y of the function $y = \sqrt[4]{x}$ is

1. $\frac{1}{4}x^{-3/4}$ 2. $\frac{1}{4}x^{-3/4}dx$ 3. $x^{-3/4}dx$ 4. 0

11. The differential of y if $y = x^5$ is

1. $5x^4$ 2. $5x^4dx$ 3. $5x^5dx$ 4. $5x^5$

12. The differential of y if $y = \sqrt{x^4 + x^2 + 1}$ is

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

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

13. The differential of y if $y = \frac{x-2}{2x+3}$ is

1. $\frac{-7}{(2x+3)^2}dx$ 2. $\frac{1}{(2x+3)^2}dx$

3. $\frac{7}{(2x+3)^2}dx$ 4. $\frac{7}{(2x+3)^2}$

14. The differential of y if y = sin2x is

1. $2\cos 2x.$ 2. $2\cos 2x.\,dx$ 3. $-2\cos 2x.dx$ 4. $\cos 2x.dx$

15. The differential of $x\tan x$ is

1. $(x\sec^2 x + \tan^2 x)$ 2. $(x\sec^2 x - \tan x)dx$

3. $x\sec^2 xdx$ 4. $(x\sec^2 x + \tan x)dx$

16. If $u(x, y) = x^4 + y^3 + 3x^2y^2 + 3x^2y$ then $\frac{\partial u}{\partial y}$ is

1. $3y^2 + 6xy + 3x^2$ 2. $3y^2 + 6xy^2 + 3x^2$

3. $3y^2 + 6x^2y + 3x^2$ 4. $3y^2 + 6x^2y^2 + 3x^2$

17. The curve $y^2 = x^2(1 - x^2)$ is defined only for

1. $x \le 2$ and $x \ge -2$ 2. $x \le 1$ and $x \ge -1$
3. $x \le -1$ and $x \ge 1$ 4. $x < 1$ and $x > -1$

18. The curve $y^2 = x^2(1-x^2)$ is symmetrical about
1. x-axis only 2. y-axis only 3. x and y axes only 4. x,y axes and the origin

19. The curve $y^2 = x^2(1-x^2)$ has
1. only one loop between x=0 and x=1
2. two loops between x=-1 and x=0
3. two loops between x=-1 and 0; 0 and 1
4. no loop

20. The curve $y^2 = x^2(1-x^2)$ has
1. an asymptote x = -1 2. an asymptote x= 1
3. two asymptotes x =1 and x = -1 4. no asymptote

21. The curve $y^2(2+x) = x^2(6-x)$ exists for
1. $-2 < x \le 6$ 2. $-2 \le x \le 6$ 3. $-2 < x < 6$ 4. $-2 \le x < 6$

22. The x-intercept of the curve $y^2(2+x) = x^2(6-x)$ is
1. 0 2. 6, 0 3. 2 4. -2

23. An asymptote to the curve $y^2(2+x) = x^2(6-x)$ is
1. $x = 2$ 2. $x = -2$ 3. $x = 6$ 4. $x = -6$

24. The curve $y^2(2+x) = x^2(6-x)$ has
1. only one loop between x = 0 and x = 6
2. two loops between x = 0 and x = 6
3. only one loop between x = -2 and x = 6
4. two loops between x= -2 and x=6

25. The curve $y^2 = x^2(1-x)$ is defined only for
1. $x \le 1$ 2. $x \ge 1$ 3. $x < 1$ 4. $x > 1$

26. The curve $y^2 = x^2(1-x)$ is symmetrical about
1. y-axis only 2. x-axis only 3. both the axes 4. origin only

27. The curve $y^2 = x^2(1-x)$ has
1. an asymptote y =0 2. an asymptote x = 1
3. an asymptote y = 1 4. no asymptote

28. The curve $y^2 = x^2(1-x)$ has

1. only one loop between x = -1 and x = 0
2. only one loop between x= 0 and x=1
3. two loops between x = -1 and x = 1
4. no loop

29. The curve $y^2 = (x-a)(x-b)^2$, $a, b > 0$ and $a > b$ does not exist for

1. $x \geq a$ 2. $x = b$ 3. $b < x < a$ 4. $x = a$

30. The curve $y^2 = (x-a)(x-b)^2$ is symmetrical about

1. origin only 2. y-axis only 3. x-axis only 4. both x and y axes

31. The curve $y^2 = (x-a)(x-b)^2$, has $a, b > 0$ and $a > b$

1. an asymptote x = a 2. an asymptote x = b
3. an asymptote y = a 4. no asymptotes

32. The curve $y^2 = (x-a)(x-b)^2$, $a, b > 0$ and $a > b$ has

1. a loop between x = a and x = b
2. two loops between x = a and x = b
3. two loops between x=0 and x= a
4. no loop

33. The curve $y^2(1+x) = x^2(1-x)$ is defined for

1. $-1 \leq x \leq 1$ 2. $-1 < x \leq 1$ 3. $-1 \leq x < 1$ 4. $-1 < x < 1$

34. The curve $y^2(1+x) = x^2(1-x)$ is symmetrical about

1. both the axes 2. origin only 3. y-axis only 4. x-axis only

35. The asymptote to the curve $y^2(1+x) = x^2(1-x)$ is

1. $x = 1$ 2. $y = 1$ 3. $y = -1$ 4. $x = -1$

36. The curve $y^2(1+x) = x^2(1-x)$ has

1. a loop between x = -1 and x = 1
2. a loop between x = -1 and x = 0
3. a loop between x = 0 and x = 1
4. no loop

37. The curve $a^2y^2 = x^2(a^2 - x^2)$ is defined for

1. $x \leq a$ and $x \geq -a$ 2. $x < a$ and $x > -a$

3. $x \le -a$ and $x \ge a$ 4. $x \le a$ and $x > -a$

38. The curve $a^2y^2 = x^2 (a^2 - x^2)$ is symmetrical about

1. x-axis only 2. y-axis only 3. both the axes 4. both the axes and origin

39. The curve $a^2y^2 = x^2 (a^2 - x^2)$ has

1. an asymptote x = a 2. an asymptote x = -a

3. an asymptote x = 0 4. no asymptotes

40. The curve $a^2y^2 = x^2 (a^2 - x^2)$ has

1. a loop between $x = a$ and $x = -a$

2. two loops between $x = -a$ and $x = 0$; $x = 0$ and $x = a$

3. two loops between $x = 0$ and $x = a$

4. no loop

41. The curve $y^2 = (x-1)\ (x-2)^2$ is not defined for

1. $x \ge 1$ 2. $x \ge 2$ 3. $x < 2$ 4. $x < 1$

42. The curve $y^2 = (x-1)\ (x-2)^2$ is symmetrical aabout

1. both x and y axes 2. x-axis only

3. y-axis only 4. both the axes and origin

43. The curve $y^2 = (x-1)\ (x-2)^2$ has

1. an asymptote $x=1$ 2. an asymptote $x=2$

3. two asymptotes $x=1$ and $x=2$ 4. no asymptotes

44. The curve $y^2 = (x-1)\ (x-2)^2$ has

1. two loops between $x= 0$ and $x=2$

2. one loop between $x= 0$ and $x=1$

3. one loop between $x=1$ and $x= 2$

4. no loop

45. If $u(x, y) = x^4 + y^3 + 3x^2y^2 + 3x^2y$ then $\frac{\partial u}{\partial x}$ is

1. $4x^3 + 6xy^2 + 6xy$ 2. $3x^4 + 6x^2y + 3xy^2$

3. $4x^3 - 6x^2y + 6xy^2$ 4. $4x^3 + 6x^2y^2 + 3xy$

* If $a^2y^2 = x^2 (a^2-x^2)$, $a>0$, then the loops are formed at

a) $-a < x < 0$ & $0 < x < a$ b) $-a \le x \le 0$ & $0 \le x \le a$

c) $-a < x \le 0$ & $0 < x \le a$ d) $-a \le x < 0$ & $0 \le x < a$

* They asymptotes to the curve $y^2(2+x) = x^2(6-x)$ is

a) x = 2 b) x = -2 c) x = 6 d) x = -6

7. INTEGRAL CALCULUS

(ONE QUESTION FOR FULL TEST)

TOTAL NUMBER OF QUESTIONS: 23

1. If $I_n = \int \sin^n x dx$, then $I_n =$

   1. $-\frac{1}{n}\sin^{n-1} x\cos x + \frac{n-1}{n} I_{n-2}$
   2. $\frac{1}{n}\sin^{n-1} x\cos x + \frac{n-1}{n} I_{n-2}$
   3. $-\frac{1}{n}\sin^{n-1} x\cos x - \frac{n-1}{n} I_{n-2}$
   4. $-\frac{1}{n}\sin^{n-1} x\cos x + \frac{n-1}{n} I_{n}$

2. $\int_0^{2a} f(x)dx = 2\int_0^{a} f(x)dx$, if

   1. f(2a-x) = f(x) 2. f(a-x) = f(x) 3. f(x) = -f(x) 4. f(-x) = f(x)

3. $\int_0^{2a} f(x)dx = o$, if

   1. f(2a-x) = f(x) 2. f(2a-x) = -f(x) 3. f(x) = -f(x) 4. f(-x) = f(x)

4. If *f(x)* is an odd function then $\int_{-a}^{a} f(x)dx$ is

   1. $2\int_0^{a} f(x)dx$ 2. $\int_0^{a} f(x)dx$ 3. 0 4. $\int_0^{a} f(a-x)\, dx$

5. $\int_0^{a} f(x)dx + \int_0^{a} f(2a-x)dx =$

   1. $\int_0^{a} f(x)dx$ 2. $2\int_0^{a} f(x)dx$ 3. $\int_0^{2a} f(x)dx$ 4. $\int_0^{2a} f(a-x)dx$

6. If *f(x)* is even function $\int_{-a}^{a} f(x)dx$ is

   1. 0 2. $2\int_0^{a} f(x)dx$ 3. $\int_0^{a} f(x)dx$ 4. $-2\int_0^{a} f(x)dx$

7. $\int_0^{a} f(x)dx$ is

   1. $\int_0^{a} f(x-a)dx$ 2. $\int_0^{a} f(a-x)dx$ 3. $\int_0^{a} f(2a-x)dx$ 4. $\int_0^{a} f(x-2a)dx$

8. $\int_a^b f(x)dx$ is

1. $2\int_0^a f(x)\,dx$
2. $\int_a^b f(a-x)\,dx$
3. $\int_a^b f(b-x)\,dx$
4. $\int_a^b f(a+b-x)\,dx$

9. If n is a positive integer, then $\int_0^\infty x^n e^{-ax}dx =$

1. $\frac{\angle n}{a^n}$
2. $\frac{\angle n+1}{a^n}$
3. $\frac{\angle n+1}{a^{n+1}}$
4. $\frac{\angle n}{a^{n+1}}$

10. If n is odd, then $\int_0^{\frac{\pi}{2}} \cos^n xdx$ is

1. $\frac{n}{n-1}\frac{n-2}{n-3}\frac{n-4}{n-5}\cdots\frac{\pi}{2}$
2. $\frac{n-1}{n}\frac{n-3}{n-2}\frac{n-5}{n-4}\cdots\frac{1}{2}\frac{\pi}{2}$
3. $\frac{n}{n-1}\frac{n-2}{n-3}\frac{n-4}{n-5}\cdots\frac{3}{2}\cdot 1$
4. $\frac{n-1}{n}\frac{n-3}{n-2}\frac{n-5}{n-4}\cdots\frac{2}{3}\cdot 1$

11. If n is even, then $\int_0^{\frac{\pi}{2}} \sin^n xdx$ is

1. $\frac{n}{n-1}\frac{n-2}{n-3}\frac{n-4}{n-5}\cdots\frac{\pi}{2}$
2. $\frac{n-1}{n}\frac{n-3}{n-2}\frac{n-5}{n-4}\cdots\frac{1}{2}\frac{\pi}{2}$
3. $\frac{n}{n-1}\frac{n-2}{n-3}\frac{n-4}{n-5}\cdots\frac{3}{2}\cdot 1$
4. $\frac{n-1}{n}\frac{n-3}{n-2}\frac{n-5}{n-4}\cdots\frac{2}{3}\cdot 1$

12. If n is even, then $\int_0^{\frac{\pi}{2}} \cos^n xdx$ is

1. $\frac{n}{n-1}\frac{n-2}{n-3}\frac{n-4}{n-5}\cdots\frac{\pi}{2}$
2. $\frac{n-1}{n}\frac{n-3}{n-2}\frac{n-5}{n-4}\cdots\frac{1}{2}\frac{\pi}{2}$
3. $\frac{n}{n-1}\frac{n-2}{n-3}\frac{n-4}{n-5}\cdots\frac{3}{2}\cdot 1$
4. $\frac{n-1}{n}\frac{n-3}{n-2}\frac{n-5}{n-4}\cdots\frac{2}{3}\cdot 1$

13. If n is odd, then $\int_0^{\pi/2}\sin^n x\,dx =$

1. $\frac{n}{n-1}\frac{n-2}{n-3}\frac{n-4}{n-5}\cdots\frac{\pi}{2}$ 2. $\frac{n-1}{n}\frac{n-3}{n-2}\frac{n-5}{n-4}\cdots\frac{1}{2}\frac{\pi}{2}$

3. $\frac{n}{n-1}\frac{n-2}{n-3}\frac{n-4}{n-5}\cdots\frac{3}{2}\cdot 1$ 4. $\frac{n-1}{n}\frac{n-3}{n-2}\frac{n-5}{n-4}\cdots\frac{2}{3}\cdot 1$

14. $\int_a^b f(x)dx$ is

1. $-\int_a^b f(x)dx$ 2. $-\int_b^a f(x)dx$ 3. $-\int_0^a f(x)dx$ 4. $2\int_0^b f(x)dx$

15. The area bounded by the curve $x = g(y)$ to the right of y-axis and the two lines $y=c$ and $y=d$ is given by

1. $\int_c^d xdx$ 2. $\int_c^a xdy$ 3. $\int_c^d ydy$ 4. $\int_c^d xdy$

16. The area bounded by the curve $x = f(y)$, y-axis and the lines $y=c$ and $y=d$ is rotated about y-axis. Then the volume of the solid is

1. $\pi\int_c^d x^2dy$ 2. $\pi\int_c^d x^2dx$ 3. $\pi\int_c^d y^2dx$ 4. $\pi\int_c^d y^2dy$

17. The area bounded by the curve $x = f(y)$ to the left of y-axis and between the lines $y=c$ and $y=d$ is

1. $\int_c^d xdy$ 2. $-\int_c^d xdy$ 3. $\int_c^d ydx$ 4. $-\int_c^d ydx$

18. The arc length of the curve $y = f(x)$ from $x=a$ to $x=b$ is

1. $\int_a^b \sqrt{1+\left(\frac{dy}{dx}\right)^2}\,dx$ 2. $\int_c^d \sqrt{1+\left(\frac{dx}{dy}\right)^2}\,dx$

3. $2\pi\int_a^b y\sqrt{1+\left(\frac{dy}{dx}\right)^2}\,dx$ 4. $2\pi\int_c^d y\sqrt{1+\left(\frac{dx}{dy}\right)^2}\,dx$

19. The surface area obtained by revolving the area bounded by the curve $y= f(x)$, the two ordinates $x=a$, $x=b$ and x-axis, about x-axis is

1. $\int_a^b \sqrt{1+\left(\frac{dy}{dx}\right)^2}\,dx$ 2. $\int_c^d \sqrt{1+\left(\frac{dx}{dy}\right)^2}\,dx$

3. $2\pi\int_a^b y\sqrt{1+\left(\frac{dy}{dx}\right)^2}\,dx$ 4. $2\pi\int_c^d y\sqrt{1+\left(\frac{dx}{dy}\right)^2}\,dx$

20. $\int_0^\infty x^5 e^{-4x} dx$ is

1. $\frac{\angle 6}{4^6}$ 2. $\frac{\angle 6}{4^5}$ 3. $\frac{\angle 5}{4^6}$ 4. $\frac{\angle 5}{4^5}$

21. $\int_0^\infty e^{-mx} x^7 dx$ is

1. $\frac{\angle m}{7^m}$ 2. $\frac{\angle 7}{m^7}$ 3. $\frac{\angle m}{7^{m+1}}$ 4. $\frac{\angle 7}{m^8}$

22. $\int_0^\infty x^6 e^{-\frac{x}{2}} dx$ is

1. $\frac{\angle 6}{2^7}$ 2. $\frac{\angle 6}{2^6}$ 3. $2^6 \angle 6$ 4. $2^7 \angle 6$

23. If $I_n = \int \cos^n x dx$, then $I_n =$

1. $-\frac{1}{n}\cos^{n-1} x \sin x + \frac{n-1}{n} I_{n-2}$ 2. $\cos^{n-1} x \sin x + \frac{n-1}{n} I_{n-2}$

3. $\frac{1}{n}\cos^{n-1} x \sin x - \frac{n-1}{n} I_{n-2}$ 4. $\frac{1}{n}\cos^{n-1} x \sin x + \frac{n-1}{n} I_{n-2}$

* The area of the region bounded by the ellips $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is

1. $2\pi a^2$ sq. units 2. $2\pi a^2$ sq. units

3. 2π ab sq. units 4. π ab sq. units

* The length of the curve x = a(t - sint), y = a(1-cost) between t= 0 and t= π is

1. 8a 2. 6a 3. 4a 4. 3a

8. DIFFERENTIAL EQUATIONS

(ONE QUESTION FOR FULL TEST)

TOTAL NUMBER OF QUESTIONS: 19

1. The order and degree of the differential equation $\frac{d^3y}{dx^3}+\left(\frac{d^2y}{dx^2}\right)^3+\left(\frac{dy}{dx}\right)^5+y=7$ are

   1. 3, 1 2. 1, 3 3. 3, 5 4. 2, 3

2. The order and degree of the differential equation $y=4\frac{dy}{dx}+3x\frac{dx}{dy}$ are

   1. 2, 1 2. 1, 2 3. 1, 1 4. 2,2

3. The order and degree of the differential equation $\frac{d^2y}{dx^2}=\left[4+\left(\frac{dy}{dx}\right)^2\right]^{\frac{3}{4}}$ are

   1. 2, 1 2. 1, 2 3. 2, 4 4. 4,2

4. The order and degree of the differential equation $(1+y')^2=y'^2$ are

   1. 2, 1 2. 1, 2 3. 2, 2 4. 1, 1

5. The order and degree of the differential equation $\frac{dy}{dx}+y=x^2$ are

   1. 1, 1 2. 1, 2 3. 2, 1 4. 0, 1

6. The order and degree of the differential equation $y'+y^2=x$ are

   1. 2, 1 2. 1, 1 3. 1, 0 4. 0, 1

7. The order and degree of the differential equation $y''+3y'^2+y^3=0$ are

   1. 2, 2 2. 2, 1 3. 1, 2 4. 3, 1

8. The order and degree of the differential equation $\frac{d^2y}{dx^2}+x=\sqrt{y+\frac{dy}{dx}}$ are

   1. 2, 1 2. 1, 2 3. 2, $\frac{1}{2}$ 4. 2,2

9. The order and degree of the differential equation $\frac{d^2y}{dx^2}-y+\left(\frac{dy}{dx}+\frac{d^3y}{dx^3}\right)^{\frac{3}{2}}=0$ are

   1. 2, 3 2. 3, 3 3. 3, 2 4. 2,2

10. The order and degree of the differential equation $y''=(y-y'^3)^{\frac{2}{3}}$ are

1. 2, 3 2. 3, 3 3. 3, 2 4. 2,2

11. The order and degree of the differential equation $y'+(y'')^2=(x+y'')^2$ are

1. 1, 1 2. 1, 2 3. 2, 1 4. 2,2

12. The order and degree of the differential equation $y'+(y'')^2=x(x+y'')^2$ are

1. 2, 2 2. 2, 1 3. 1, 2 4. 1, 1

13. The order and degree of the differential equation $\left(\frac{dy}{dx}\right)^2+x=\frac{dx}{dy}+x^2$ are

1. 2, 2 2. 2, 1 3. 1, 2 4. 1, 3

14. The order and degree of the differential equation *sinx(dx+dy) = cosx(dx-dy)* are

1. 1, 1 2. 0, 0 3. 1, 2 4. 2, 1

15. The differential equation corresponding to xy = c^2 where *c* is an arbitrary constant, is

1. $xy''+x=0$ 2. $y''=0$ 3. $xy'+y=0$ 4. $xy''-x=0$

16. In finding the differential equation corresponding to y = e^{mx} where *m* is the arbitrary constant, then *m* is

1. $\frac{y}{y'}$ 2. $\frac{y'}{y}$ 3. y' 4. y

17. The solution of a linear differential equation $\frac{dx}{dy}+Px=Q$ where P and Q are functions of *y* is

1. $y(I.F)=\int(I.F)Qdx+c$ 2. $x(I.F)=\int(I.F)Qdy+c$

3. $y(I.F)=\int(I.F)Qdy+c$ 4. $x(I.F)=\int(I.F)Qdx+c$

18. The solution of a linear differential equation $\frac{dy}{dx}+Py=Q$ where P and Q are functions of *x* is

1. $y(I.F)=\int(I.F)Qdx+c$ 2. $x(I.F)=\int(I.F)Qdy+c$

3. $y(I.F)=\int(I.F)Qdy+c$ 4. $x(I.F)=\int(I.F)Qdx+c$

19. Identify the incorrect statement.

1. The order of a differential equation is the order of the highest order derivative occurring in it.

2. The degree of the differential equation is the degree of the highest order derivative which occurs in it. (The derivatives are free from radicals and fractions).

3. $\frac{dy}{dx}=\frac{f_1(x,y)}{f_2(x,y)}$ is the first order and first degree homogeneous differential equation.

4. $\frac{dy}{dx}+xy=e^x$ is a linear differential equation in *x*.

9. DISCRETE MATHEMATICS

(ONE QUESTION FOR FULL TEST)

TOTAL NUMBER OF QUESTIONS: 39

1. Which of the following are statements?

   (i) Chennai is the capital of TamilNadu.

   (ii) The earth is a planet.

   (iii) Rose is a flower.

   (iv) Every triangle is an isosceles triangle.

   1. all 2. (i) and (ii) 3. (ii) and (iii) 4. (iv) only

2. Which of the following are not statements?

   (i) Three plus four is eight.

   (ii) The sun is a planet.

   (iii) Switch on the light.

   (iv) Where are you going?

   1. (i) and (ii) 2. (ii) and (iii) 3. (iii) and (iv) 4. (iv) only

3. The truth values of the following statements are

   (i) Ooty is in Tamilnadu and 3+4 = 8

   (ii) Ooty is in Tamilnadu and 3+4 = 7

   (iii) Ooty is in Kerala and 3+4 = 7

   (iv) Ooty is in Kerala and 3+4 = 8

   1. FTFF 2. FFFT 3. TTFF 4.TFTF

4. The truth values of the following statements are

   (i) Chennai is in India or $\sqrt{2}$ is an integer.

   (ii) Chennai is in India or $\sqrt{2}$ is an irrational number.

   (iii) Chennai is in China or $\sqrt{2}$ is an integer.

(iv) Chennai is in China or $\sqrt{2}$ is an irrational number.

1. TFTF 2. TFFT 3. FTFT 4. TTFT

5. Which of the following are not statements?

(i) All natural numbers are integers.

(ii) A square has five sides.

(iii) The sky is blue.

(iv) How are you?

1. (iv) only 2. (i) and (iv) 3. (i), (ii), (iii) 4. (iii) and (iv)

6. Which of the following are statements?

(i) 7+2<10.

(ii) The set of rational numbers is finite.

(iii) How beautiful you are!

(iv) Wish you all success.

1. (iii), (iv) 2. (i), (ii) 3. (i), (iii) 4. (ii), (iv)

7. The truth values of the following statements are

(i) All the sides of a rhombus are equal in length.

(ii) $1+\sqrt{19}$ is an irrational number.

(iii) Milk is white.

(iv) The number 30 has four prime factors.

1. TTTF 2. TTTT 3. TFTF 4. FTTT

8. The truth values of the following statements are

(i) Paris is in France.

(ii) sinx is an even function.

(iii) Every square matrix is non-singular.

(iv) Jupiter is a planet.

1. TFFT 2. FTFT 3. FTTF 4.FFTT

9. Let p be "Kamala is going to school" and q be "There are twenty students in the class". "Kamala is not going to school or there are twenty students in the class" stands for

1. $p \vee q$ 2. $p \wedge q$ 3. $\sim p$ 4. $\sim p \vee q$

10. If p stands for the statement "Sita likes reading" and q for the statement "Sita likes playing". "Sita likes neither reading nor playing" stands for

1. $\sim p \wedge \sim q$ 2. $p \wedge \sim q$ 3. $\sim p \wedge q$ 4. $p \wedge q$

11. If p is true and q is unknown then

1. $\sim p$ is true 2. $p \vee (\sim p)$ is false

3. $p \wedge (\sim p)$ is true 4. $p \vee q$ is true

12. If p is true and q is false then which of the following is not true?

1. $p \to q$ is false 2. $p \vee q$ is true

3. $p \wedge q$ is false 4. $p \leftrightarrow q$ is true

13. Which of the following is not true?

1. Negation of a negation of a statement is the statement itself.

2. If the last column of its truth table contains only T then it is tautology.

3. If the last column of its truth table contains only F then it is contradiction.

4. If p and q are any two statements then $p \leftrightarrow q$ is a tautology.

14. Which of the following are binary operations on R?

a. a*b = min{a, b} b. a*b = max{a, b} c. a*b = a d. a*b = b

1. all 2. a, b and c 3. b,c and d 4. c, d

15. '+' is not a binary operation on

1. N 2. Z 3. C 4. Q-{0}

16. '-' is a binary operation on

1. N 2. Q-{0} 3. R-{0} 4. Z

17. '$\div$' is a binary operation on

1. N 2. R 3. Z 4. C-{0}

18. In congruence modulo5, $\{x \in z / x = 5k+2, k \in z\}$ represents

1. $[0]$ 2. $[5]$ 3. $[7]$ 4. $[2]$.

19. $[5] \cdot_{12} [11]$ is

1. $[55]$ 2. $[12]$ 3. $[7]$ 4. $[11]$

20. $[3] +_8 [7]$ is

1. $[10]$ 2. $[8]$ 3. $[5]$ 4. $[2]$

21. In the group (G, .), G = {1, -1, i, -i} the order of -1 is

1. -1 2. 1 3. 2 4. 0

22. In the group (G, .), G = {1, -1, i, -i} the order of -i is

1. 2 2. 0 3. 4 4. 3

23. In the group (G, .), G = $\{1, \omega, \omega^2\}$, ω is cube root of unity, then O(ω^2) is

1. 2 2. 1 3. 4 4. 3

24. In the group $(Z_4, +_4)$, order of $[0]$ is

1.1 2. ∞ 3. can't be determined 4. 0

25. In the group $(Z_4, +_4)$, order of $[3]$ is

1.4 2. 3 3. 2 4. 1

26. In $(S, \circ)$, $x \circ y = x$, $x, y \in S$ then '$\circ$' is

1. only associative 2. only commutative

3. associative and commutative 4. neither associative nor commutative

27. In (N, *), x*y = max{x, y}, x, y $\in$ N, then (N, *) is

1. only closed 2. only semi group 3. only monoid 4. a group

28. The set of positive even integers, with usual multiplication forms

1. a finite group 2. only a semi group 3. only a monoid 4. an infinite group

29. The set of positive even integers, with usual addition forms

1. a finite group 2. only a semi group 3. only a monoid 4. an infinite group

30. In the group $(Z_5 - \{[0]\}, \bullet_5)$, $O([3])$ is

1. 5 2. 3 3. 4 4. 2

31. In the group (G, .), G = {1, -1, i, -i} the order of 1 is

1. 2 2. 0 3. 4 4. 1

32. In the group (G, .), G = {1, -1, i, -i} the order of i is

1. 2 2. 0 3. 4 4. 3

33. In the group (G, .), G = $\{1, \omega, \omega^2\}$, ω is cube root of unity, then O(ω) is

1. 2 2. 1 3. 4 4. 3

34. In the group (G, .), G = $\{1, \omega, \omega^2\}$, ω is cube root of unity, then O(1) is

1. 2 2. 1 3. 4 4. 3

35. In the group $(Z_4, +_4)$, order of O([1]) is

1.1 2. ∞ 3. cannot be determined 4. 4

36. In the group $(Z_4, +_4)$, O([2]) is

1.1 2. 2 3.cannot be determined 4. 0

37. In the group $(Z_5 - \{[0]\}, \bullet_5)$, $O([2])$ is

1. 5 2. 3 3. 4 4. 2

38. In the group $(Z_5 - \{[0]\}, \bullet_5)$, $O([4])$ is

1. 5 2. 3 3. 4 4. 2

39. In the group $(Z_5 - \{[0]\}, \bullet_5)$, $O([1])$ is

1. 1 2. 2 3. 3 4. 4

*. The set of positive even numbers, with usual addition forms

1. a finite group 2. only a semigroup

3. only a monoid 4. an infinite group

*. If the operation * defined by a*b = a+b-ab in Q^+ , which does not has inverse?

1. 2 2. -2 3. 1 4. $\frac{-1}{2}$

*. Which of the following is correct ?

1. an element of a group can have more than one inverse.

2. If every element of a group is its own inverse, then the group is abelian.

3. The set of all 2x2 real matrices forms a group under matrix multiplication.

4. $(a * b)^{-1} = a^{-1} * b^{-1}$ for all a , b □G

*. In $(S, \circ)$, $x \circ y = x$, $x, y \in S$ then '∘' is

1. only associative 2. only commutative

3. associative and commutative 4. neither associative nor commutative

*. In the multiplicative group of n^{th} roots of unity, the inverse of $□^k$ is (k < n)1

1) $□^{1/k}$ 2) $□^{-1}$ 3) $□^{n-k}$ 4) $□^{n/k}$

*. In the set of integers under the operation * is defined by a * b = a + b -1 the identity element is[

1)0 2)1 3)a 4)b

*. In the set of real numbers R, an operation * is defined by a * b = $\sqrt{a^2 + b^2}$

Then the value of (3 * 4)* 5 is

1)5 2) $5\sqrt{2}$ 3) 25 4) 56

*. In the set of integers under the operation * defined by a * b = a + b -1 the identity element is

1)0 b)1 c)a d)b

*. In a group $(Z_7, +_7)$ the value of $[3]^{-1} +_7 [2]^{-1} +_7 [5]$=

1. $[0]$ 2. $[5]$ 3. $[1]$ 4. $[3]$

10. PROBABILITY DISTRIBUTIONS

(ONE QUESTION FOR FULL TEST)

TOTAL NUMBER OF QUESTIONS: 15

1. A discrete random variable takes
   1. only a finite number of values
   2. all possible values between certain given limits
   3. infinite number of values
   4. a finite or countable number of values

2. A continuous random variable takes
   1. only a finite number of values
   2. all possible values between certain given limits
   3. infinite number of values
   4. a finite or countable number of values

3. If X is a discrete random variable then $P(X \geq a) =$

   1. $P(X<a)$ 2. $1 - P(X \leq a)$ 3. $1 - P(X<a)$ 4. 0

4. If X is a continuous random variable then $P(X \geq a) =$

   1. $P(X<a)$ 2. $1 - P(X>a)$ 3. $P(X>a)$ 4. $1-P(X \leq a-1)$

5 If X is a continuous random variable then $P(a<X<b) =$

   1. $P(a \leq X \leq b)$ 2. $P(a<X \leq b)$ 3. $P(a \leq X<b)$ 4. all the three above

6. A continuous random variable X has probability density function ‘f(x)’ then

   1. $0 \leq f(x) \leq 1$ 2. $f(x) \geq 0$ 3. $f(x) \leq 1$ 4. $0 < f(x) < 1$

7. A discrete random variable X has probability mass function p(x), then

   1. $0 \leq p(x) \leq 1$ 2. $p(x) \geq 0$ 3. $p(x) \leq 1$ 4. $0 < p(x) < 1$

8. Mean and variance of binomial distribution are

   1. np, npq 2. np, $\sqrt{npq}$ 3. np, np 4. np, npq

9. Which of the following is or are correct regarding normal distribution curve ?

   a. symmetrical about the line X = μ (mean) b. Mean = median = mode

   c. unimodal d. Points of inflection are at X = $\mu \pm \sigma$

   1. a, b only 2. b,d only 3. a.b,c only 4. all

10. For a standard normal distribution the mean and variance are

1. μ, σ^2 2. μ, σ 3. 0, 1 4. 1, 1

11. The probability density function of the standard normal variate Z is $\varphi(z) =$

1. $\frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{1}{2}z^2}$ 2. $\frac{1}{\sqrt{2\pi}} e^{-z^2}$ 3. $\frac{1}{\sqrt{2\pi}} e^{\frac{1}{2}z^2}$ 4. $\frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}z^2}$

12. If X is a discrete random variable then which of the following is correct ?

1. $0 \le F(x) < 1$ 2. $F(-\infty) = 0$ *and* $F(\infty) \le 1$

3. $P[X = x_n] = F(x_n) - F(x_{n-1})$ 4. F(x) is a constant function

13. If X is a continuous random variable then which of the following is incorrect ?

1. $F'(x) = f(x)$ 2. $F(\infty) = 1$ *and* $F(-\infty) = 0$

3. $P[a \le x \le b] = F(b) - F(a)$ 4. $P[a \le x < b] \ne F(b) - F(a)$

14. Which of the following are correct?

(i) E(aX+b) = aE(X)+b (ii) $\mu_2 = \mu_2' - (\mu_1')^2$

(iii) $\mu_2 = \text{var}\,iance$ (iv) var(aX+b) = a^2var(X)

1. all 2. (i), (ii), (iii) 3. (ii), (iii) 4. (i), (iv)

15. Which of the following is not true regarding the normal distribution?

1. skewness is zero. 2. mean = median = mode

3. the points of inflection are at X = $\mu \pm \sigma$

4. maximum height of the curve is $\frac{1}{\sqrt{2\pi}}$

ADDITIONAL

* In 16 throws of a die getting an even number is considered a success. Then the variance of the successes is

1)4 2)6 3)2 4)256

* The expected value of the number on a die when the die is thrown

1. 7 2. 6 3. $\frac{7}{2}$ 4. $\frac{5}{2}$

* For a normal distribution with mean μ = 34 and variance σ^2 = 16, P(30<X<60) = Where X is normal variate and Z is the corresponding standard normal variate

1. P(-0.25<z<0.25) 2. P(0<z<1.625)

3. P(0.25<z<1.625) 4. P(-0.25<z<1.625)

* For a standard normal distribution the mean and variance are

1. μ , σ^2 2. μ , σ 3. 0, 1 4. 1,1

* X is a random variable taking the values 3, 4 and 7 with probabilities $\frac{1}{3}, \frac{1}{4}$ and $\frac{4}{7}$.

Then E (X) is

1)5 2)6 3)7 4)8

* For a Binomial distribution with mean 2 and variance $\frac{4}{3}$, p = ?

1. $\frac{2}{3}$ 2. $\frac{1}{3}$ 3. $\frac{3}{4}$ 4. $\frac{2}{\sqrt{3}}$

* In a normal distribution Z values for 30 and 40 are 2.5 and 3.75 respectively then mean and standard deviation are

1. 10, 6 2. 15, 4 3. 15, 8 4. 10, 8

* Eight coins are tossed simultaneously. Then the probability of getting atleast 7 heads is

1. $\frac{1}{258}$ 2. $\frac{9}{256}$ 3. $\frac{37}{258}$ 4. $\frac{1}{32}$

* In a Poisson distribution the 2^{nd} moment about the origin is 12. Its arithmetic mean is given by

1. -3 2. -4 3. 3 4. 4

* A random variable X follows Poisson distribution such that P(X=1) = P(X=2) then P(X=0) is

1. e^{-1} 2. e^{-2} 3. $2e^{-2}$ 4. $\frac{e^{-2}}{2}$

* $F(-\infty)+F(\infty)=$

1. 0 2. 2 3. 1.5 4. 1

ALL THE BEST