



## +2 MATH COME BOOK-CREATIVE ONE MARK QUESTIONS

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13. In the system of 3 linear equations with three unknowns, if  $\Delta = 0$  and all  $2 \times 2$  minors of  $\Delta$ ,  $\Delta_x$ ,  $\Delta_y$ ,  $\Delta_z$  are zeroes and atleast one non-zero element is in  $\Delta$  then the system is
- consistent
  - inconsistent
  - consistent and the system reduces to two equations
  - consistent and the system reduces to a single equation
14. Every homogeneous system
- is always consistent
  - has only trivial solution
  - has infinitely many solutions
  - need not be consistent
15. If  $\rho(A) = \rho[A, B]$  then the system is
- consistent and has infinitely many solutions
  - consistent and has a unique solution
  - consistent
  - inconsistent
16. If  $\rho(A) = \rho[A, B] =$  the number of unknowns then the system is
- consistent and has infinitely many solutions
  - consistent and has a unique solution
  - consistent
  - inconsistent
17.  $\rho(A) \neq \rho(A, B)$  then the system is
- consistent and has infinitely many solutions
  - consistent and has a unique solution
  - consistent
  - inconsistent
18. In the system of 3 linear equations with three unknowns  $\rho(A) = \rho(A, B) = 1$  then the system
- has unique solution
  - reduces to 2 equations and has infinitely many solution
  - reduces to a single equation and has infinitely many solution
  - is inconsistent
19. In the homogeneous system with three unknowns,  $\rho(A) =$  number of unknowns then the system has
- only trivial solution
  - reduces to 2 equations and has infinitely many solution
  - reduces to a single equation and has infinitely many solution
  - is inconsistent
20. In the system of 3 linear equations with three unknowns, in the non-homogeneous system  $\rho(A) = \rho(A, B) = 2$  then the system
- has unique solution
  - reduces to 2 equations and has infinitely many solution
  - reduces to a single equation and has infinitely many solution
  - is inconsistent
21. In the homogeneous system  $\rho(A) <$  the number of unknowns then the system has
- only trivial solution
  - trivial solution and infinitely many non-trivial solutions
  - only non-trivial solutions
  - no solution
22. Cramer's rule is applicable only ( with three unknowns ) when
- $\Delta \neq 0$
  - $\Delta = 0$
  - $\Delta = 0, \Delta_x \neq 0$
  - $\Delta_x = \Delta_y = \Delta_z = 0$
23. Which of the following statement is correct regarding homogeneous system
- always inconsistent
  - has only trivial solution
  - has only non-trivial solutions
  - has only trivial solution only if rank of the coefficient matrix is equal to the number of unknowns

**CHAPTER – II**  
**( VECTOR ALGEBRA )**

01. 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  
 a) 19                                    b) 3                                        c) -19                                      d) 14
02. 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  
 a) 2                                        b) -2                                        c) 3                                        d) 4
03. 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  
 a) 7                                        b) -7                                        c) 5                                        d) 6
04. If  $m\vec{i} + 2\vec{j} + \vec{k}$  and  $4\vec{i} - 9\vec{j} + 2\vec{k}$  are perpendicular then m is  
 a) -4                                        b) 8                                        c) 4                                        d) 12
05. If  $5\vec{i} - 9\vec{j} + 2\vec{k}$  and  $m\vec{i} + 2\vec{j} + \vec{k}$  are perpendicular then m is  
 a)  $\frac{5}{16}$                                         b)  $-\frac{5}{16}$                                         c)  $\frac{16}{5}$                                         d)  $-\frac{16}{5}$
06. 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  
 a)  $\frac{\pi}{6}$                                         b)  $-\frac{\pi}{6}$                                         c)  $-\frac{\pi}{3}$                                         d)  $\frac{\pi}{3}$
07. The angle between the vectors  $3\vec{i} - 2\vec{j} - 6\vec{k}$  and  $4\vec{i} - \vec{j} + 8\vec{k}$  is  
 a)  $\cos^{-1}\left(\frac{34}{63}\right)$                                         b)  $\sin^{-1}\left(\frac{-34}{63}\right)$                                         c)  $\sin^{-1}\left(\frac{34}{63}\right)$                                         d)  $\cos^{-1}\left(\frac{-34}{63}\right)$
08. The angle between the vectors  $\vec{i} - \vec{j}$  and  $\vec{j} - \vec{k}$  is  
 a)  $\frac{\pi}{3}$                                         b)  $-\frac{2\pi}{3}$                                         c)  $-\frac{\pi}{3}$                                         d)  $\frac{2\pi}{3}$
09. The projection of the vector  $7\vec{i} + \vec{j} - 4\vec{k}$  on  $2\vec{i} + 6\vec{j} + 3\vec{k}$  is  
 a)  $\frac{7}{8}$                                         b)  $\frac{8}{\sqrt{66}}$                                         c)  $\frac{8}{7}$                                         d)  $\frac{\sqrt{66}}{8}$
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  
 a) 4                                        b) -4                                        c) 3                                        d) 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  $\lambda$  is  
 a)  $\frac{2}{3}$                                         b)  $-\frac{2}{3}$                                         c)  $\frac{3}{2}$                                         d)  $-\frac{3}{2}$
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  
 a) -15                                        b) 15                                        c) 30                                        d) -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  
 a)  $\frac{3}{2}$                                         b)  $\frac{2}{3}$                                         c)  $-\frac{3}{2}$                                         d)  $-\frac{2}{3}$
14. If  $\vec{a}, \vec{b}, \vec{c}$  are three mutually perpendicular unit vectors, then  $|\vec{a} + \vec{b} + \vec{c}| =$   
 a) 3                                        b) 9                                        c)  $3\sqrt{3}$                                         d)  $\sqrt{3}$
15. If  $|\vec{a} + \vec{b}| = 60$ , and  $|\vec{a} - \vec{b}| = 40$  and  $|\vec{b}| = 46$  then  $|\vec{a}|$  is  
 a) 22                                        b) 21                                        c) 18                                        d) 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

- a) 25                                  b) -25                                  c) 5                                  d) 5
17. The projection of  $\vec{i} - \vec{j}$  on z-axis is  
 a) 0    b) 1    c) -1    d) 2
18. The projection of  $\vec{i} + 2\vec{j} - 2\vec{k}$  on  $2\vec{i} - \vec{j} + 5\vec{k}$  is  
 a)  $\frac{-10}{\sqrt{30}}$                                   b)  $\frac{10}{\sqrt{30}}$                                   c)  $\frac{1}{3}$     d)  $\frac{\sqrt{10}}{30}$
19. The projection of  $3\vec{i} + \vec{j} - \vec{k}$  on  $4\vec{i} - \vec{j} + 2\vec{k}$  is  
 a)  $\frac{9}{\sqrt{21}}$                                   b)  $\frac{-9}{\sqrt{21}}$                                   c)  $\frac{81}{\sqrt{21}}$                                   d)  $\frac{-81}{\sqrt{21}}$
20. The work done in moving a 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  
 a) 25    b) 26    c) 27    d) 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 straightline is given to be 5 units. The value of a is  
 a) -3    b) 3    c) 8    d) -8
22. If  $|\vec{u}|=3, |\vec{v}|=4$  and  $\vec{a} \cdot \vec{b} = 9$  then  $|\vec{a} \times \vec{b}|$  is  
 a)  $3\sqrt{7}$                                   b) 63    c) 69    d)  $\sqrt{69}$
23. The angle between two vectors  $\vec{a}$  and  $\vec{b}$  if  $|\vec{a} \times \vec{b}| = \vec{a} \cdot \vec{b}$  is  
 a)  $\frac{\pi}{4}$     b)  $\frac{\pi}{3}$     c)  $\frac{\pi}{6}$     d)  $\frac{\pi}{2}$
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  
 a)  $\frac{\pi}{4}$     b)  $\frac{\pi}{3}$     c)  $\frac{\pi}{6}$     d)  $\frac{\pi}{2}$
25. The d.c.s of a vector whose direction ratios are 2,-3, -6 are  
 a)  $\left(\frac{2}{7}, \frac{-3}{7}, \frac{-6}{7}\right)$                                   b)  $\left(\frac{2}{49}, \frac{3}{49}, \frac{-6}{49}\right)$  c)  $\left(\frac{\sqrt{2}}{7}, \frac{\sqrt{3}}{7}, \frac{-\sqrt{6}}{7}\right)$                                   d)  $\left(\frac{2}{7}, \frac{3}{7}, \frac{6}{7}\right)$
26. The unit normal vectors to the plane  $2x - y + 2z = 5$  are  
 a)  $2\vec{i} - \vec{j} + 2\vec{k}$                                   b)  $\frac{1}{3}(2\vec{i} - \vec{j} + 2\vec{k})$                                   c)  $-\frac{1}{3}(2\vec{i} - \vec{j} + 2\vec{k})$                                   d)  $\pm \frac{1}{3}(2\vec{i} - \vec{j} + 2\vec{k})$
27. The length of the perpendicular from the origin to the plane  $\vec{r} \cdot (3\vec{i} + 4\vec{j} + 12\vec{k}) = 26$  is  
 a) 26    b)  $26/169$     c) 2    d)  $1/2$
28. The distance from the origin to the plane  $\vec{r} \cdot (2\vec{i} - \vec{j} + 5\vec{k}) = 7$  is  
 a)  $\frac{7}{\sqrt{30}}$     b)  $\frac{\sqrt{30}}{7}$     c)  $\frac{30}{7}$     d)  $\frac{7}{30}$
29. Chord AB is a diameter of the sphere  $|\vec{r} - (2\vec{i} + \vec{j} - 6\vec{k})| = \sqrt{18}$  with coordinate of A as (3,2,-2) The coordinates of B is  
 a) (1,0,10)                                  b) (-1,0,-10)                                  c) (-1,0,10)                                  d) (1,0,-10)
30. The centre and radius of the sphere  $|\vec{r} - (2\vec{i} - \vec{j} + 4\vec{k})| = 5$  are

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31. The centre and radius of the sphere  $\left| 2\vec{r} + (3\vec{i} - \vec{j} + 4\vec{k}) \right| = 4$  are  
 a)  $(2, -1, 4)$  and 5      b)  $(2, 1, 4)$  and 5      c)  $(-2, 1, 4)$  and 6      d)  $(2, 1, -4)$  and 5
32. The vector equation of a plane passing through a point where P, V is  $\vec{a}$  and perpendicular to a vector  $\vec{n}$  is  
 a)  $\vec{r} \cdot \vec{n} = \vec{a} \cdot \vec{n}$       b)  $\vec{r} \times \vec{n} = \vec{a} \times \vec{n}$       c)  $\vec{r} + \vec{n} = \vec{a} + \vec{n}$       d)  $\vec{r} - \vec{n} = \vec{a} - \vec{n}$
33. The vectors equation of a plane whose distance from the origin is p and perpendicular to a vector  $\vec{n}$  is  
 a)  $\vec{r} \cdot \vec{n} = p$       b)  $\vec{r} \cdot \vec{n} = q$       c)  $\vec{r} \times \vec{n} = p$       d)  $\vec{r} \cdot \vec{n} = p$
34. The non-parametric vector equation of a plane passing through a point whose P, V is  $\vec{a}$  and parallel to  $\vec{u}$  and  $\vec{v}$  is  
 a)  $[\vec{r} - \vec{a}, \vec{u}, \vec{v}] = 0$       b)  $[\vec{r}, \vec{u}, \vec{v}] = 0$       c)  $[\vec{r}, \vec{a}, \vec{u} \times \vec{v}] = 0$       d)  $[\vec{a}, \vec{u}, \vec{v}] = 0$
35. The non parametric vector equation of a plane passing through the point whose P, V s are  $\vec{a}, \vec{b}$  and parallel to  $\vec{v}$ , is  
 a)  $[\vec{r} - \vec{a}, \vec{b} - \vec{a}, \vec{v}] = 0$       b)  $[\vec{r}, \vec{b} - \vec{a}, \vec{v}] = 0$       c)  $[\vec{a}, \vec{b}, \vec{v}] = 0$       d)  $[\vec{r}, \vec{a}, \vec{b}] = 0$
36. The non-parametric vector equation of a plane passing through three points whose P, Vs are  $\vec{a}, \vec{b}, \vec{c}$  is  
 a)  $[\vec{r} - \vec{a}, \vec{b} - \vec{a}, \vec{c} - \vec{a}] = 0$       b)  $[\vec{r}, \vec{a}, \vec{b}] = 0$       c)  $[\vec{r}, \vec{b}, \vec{c}] = 0$       d)  $[\vec{a}, \vec{b}, \vec{c}] = 0$
37. The vector equation of a plane passing through the line of intersection the planes  $\vec{r} \cdot \vec{n}_1 = q_1$  and  $\vec{r} \cdot \vec{n}_2 = q_2$  is  
 a)  $(\vec{r} \cdot \vec{n}_1 - q_1) + \lambda (\vec{r} \cdot \vec{n}_2 - q_2) = 0$       b)  $\vec{r} \cdot \vec{n}_1 + \vec{r} \cdot \vec{n}_2 = q_1 + \lambda q_2$   
 c)  $\vec{r} \times \vec{n}_1 + \vec{r} \times \vec{n}_2 = q_1 + q_2$       d)  $\vec{r} \times \vec{n}_1 - \vec{r} \times \vec{n}_2 = q_1 + q_2$
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.  
 a)  $\cos \theta = \frac{\vec{a} \cdot \vec{n}}{q}$       b)  $\cos \theta = \frac{\vec{b} \cdot \vec{n}}{|\vec{b}| |\vec{n}|}$       c)  $\sin \theta = \frac{\vec{a} \cdot \vec{b}}{|\vec{n}|}$       d)  $\sin \theta = \frac{\vec{b} \cdot \vec{n}}{|\vec{b}| |\vec{n}|}$
39. The vector equation of a sphere whose centre is origin and radius 'a' is  
 a)  $r = \vec{a}$       b)  $\vec{r} - \vec{c} = \vec{a}$       c)  $|\vec{r}| = |\vec{a}|$       d)  $\vec{r} = a$

**CHAPTER - III  
COMPLEX NUMBERS**

01. The complex number form of  $\sqrt{-35}$  is  
 a)  $i\sqrt{35}$       b)  $-i\sqrt{35}$       c)  $i\sqrt{-35}$       d)  $35i$
02. The complex number form of  $3 - \sqrt{-7}$  is  
 a)  $-3 + i\sqrt{7}$       b)  $3 - i\sqrt{7}$       c)  $3 - i7$       d)  $3 + i7$
03. Real and imaginary parts of  $4 - i\sqrt{3}$  are  
 a)  $4, \sqrt{3}$       b)  $4, -\sqrt{3}$       c)  $-\sqrt{3}, 4$       d)  $\sqrt{3}, 4$
04. Real and imaginary parts of  $\frac{3}{2}i$  are  
 a)  $0, 3/2$       b)  $3/2, 0$       c)  $2, 3$       d)  $3, 2$
05. The complex conjugate of  $2 + i\sqrt{7}$  is  
 a)  $-2 + i\sqrt{7}$       b)  $-2 - i\sqrt{7}$       c)  $2 - i\sqrt{7}$       d)  $2 + i\sqrt{7}$

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06. The complex conjugate of  $-4 - i$  9
- a)  $-4 + i$                       b)  $4 + i$                       c)  $4 - i$                       d)  $-4 - i$  9
07. The complex conjugate of  $\sqrt{5}$  is
- a)  $\sqrt{5}$                       b)  $-\sqrt{5}$                       c)  $i\sqrt{5}$                       d)  $-i\sqrt{5}$
08. The standard form  $(a + ib)$  of  $3 + 2i + (-7 - i)$  is
- a)  $4 - i$                       b)  $-4 + i$                       c)  $4 + i$                       d)  $4 + 4i$
09. If  $a + ib = (8 - 6i) - (2i - 7)$  then the values of a and b are
- a) 8, -15                      b) 8, 15                      c) 15, 9                      d) 15, -8
10. If  $p + iq = (2 - 3i)(4 + 2i)$  then q is
- a) 14                      b) -14                      c) -8                      d) 8
11. The conjugate of  $(2 + i)(3 - 2i)$  is
- a)  $8 - i$                       b)  $-8 - i$                       c)  $-8 + i$                       d)  $8 + i$
12. The real and imaginary parts of  $(2 + i)(3 - 2i)$  are
- a) -1, 8                      b) -8, 1                      c) 8, -1                      d) -8, -1
13. The modulus values of  $-2 - 2i$  and  $2 - 3i$
- a)  $\sqrt{5}, 5$                       b)  $2\sqrt{5}, \sqrt{15}$                       c)  $2\sqrt{2}, \sqrt{13}$                       d) -4, 1
14. The modulus values of  $-3 - 2i$  and  $2 - 3i$
- a) 5, 5                      b)  $\sqrt{5}, 7$                       c)  $\sqrt{6}, 1$                       d)  $\sqrt{13}, 5$
15. The cube roots of unity are
- a) in G.P. with common ratio  $\omega$                       b) in G.P. with common difference  $\omega^2$   
c) in A.P. with common difference  $\omega$                       d) in A.P. with common difference  $\omega^2$
16. The arguments of nth roots of a complex number differ by
- a)  $\frac{2\pi}{n}$                       b)  $\frac{\pi}{n}$                       c)  $\frac{3\pi}{n}$                       d)  $\frac{4\pi}{n}$
17. Which of the following statements is correct?
- a) negative complex numbers exist                      b) order relation does not exist in real numbers  
c) order relation exist in complex numbers                      d)  $(1 + i) > (3 - 2i)$  is meaningless
18. Which of the following are correct ?
- i)  $\operatorname{Re}(Z) \leq |Z|$                       ii)  $\operatorname{Im}(Z) \geq |Z|$                       iii)  $|\overline{Z}| = |Z|$                       iv)  $(\overline{Z^n}) = (\overline{Z})^n$
- a) (i), (ii)                      b) (ii), (iii)                      c) (ii),(iii) and (iv)                      d) (i),(iii) and (iv)
19. The values of  $\overline{\overline{Z}} + \overline{Z}$  is
- a)  $2 \operatorname{Re}(Z)$                       b)  $\operatorname{Re}(Z)$                       c)  $\operatorname{Im}(Z)$                       d)  $2 \operatorname{Im}(Z)$
20. The value of  $Z - \overline{Z}$  is
- a)  $2 \operatorname{Im}(Z)$                       b)  $2i \operatorname{Im}(Z)$                       c)  $\operatorname{Im}(Z)$                       d)  $i \operatorname{Im}(Z)$
21. The value of  $Z \overline{Z}$  is
- a)  $|Z|$                       b)  $|Z|^2$                       c)  $2|Z|$                       d)  $2|Z|^2$
22. If  $|Z - Z_1| = |Z - Z_2|$  then the locus of Z is
- a) a circle with centre at the origin  
b) a circle with centre at  $Z_1$   
c) a straight line passing through the origin  
d) is a perpendicular bisector of the line joining  $Z_1$  and  $Z_2$

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23. If  $\omega$  is a cube root of unity then  
 a)  $\omega^2 = 1$                       b)  $1 + \omega = 0$                       c)  $1 + \omega + \omega^2 = 0$                       d)  $1 - \omega + \omega^2 = 0$
24. The principal value of  $\arg Z$  lies in the interval  
 a)  $\left[0, \frac{\pi}{2}\right]$                       b)  $(-\pi, \pi]$                       c)  $[0, \pi]$                       d)  $(-\pi, 0]$
25. If  $Z_1$  and  $Z_2$  are any two complex numbers then which one of the following is false  
 a)  $\operatorname{Re}(Z_1 + Z_2) = \operatorname{Re}(Z_1) + \operatorname{Re}(Z_2)$                       b)  $\operatorname{Im}(Z_1 + Z_2) = \operatorname{Im}(Z_1) + \operatorname{Im}(Z_2)$   
 c)  $\arg(Z_1 + Z_2) = \arg(Z_1) + \arg(Z_2)$                       d)  $|Z_1 Z_2| = |Z_1| + |Z_2|$
26. The fourth roots of unity are  
 a)  $1 \pm i, -1 \pm i$                       b)  $\pm i, 1 \pm i$                       c)  $\pm 1, \pm i$                       d)  $1, -1$
27. The fourth roots of unity form the vertices of  
 a) an equilateral triangle                      b) a square                      c) a hexagon                      d) a rectangle
28. Cube roots of unity are  
 a)  $1, \frac{-1 \pm i\sqrt{3}}{2}$                       b)  $i, -1 \pm \frac{i\sqrt{3}}{2}$                       c)  $1, \frac{1 \pm i\sqrt{3}}{2}$                       d)  $i, \frac{1 \pm i\sqrt{3}}{2}$
29. The number distinct values of  $(\cos \theta + i \sin \theta)^{p/q}$  where p and q are non-zero integers prime to each other is  
 a) p                      b) q                      c) p+q                      d) p-q
30. The value of  $e^{i\theta} + e^{-i\theta}$  is  
 a)  $2 \cos \theta$                       b)  $\cos \theta$                       c)  $2 \sin \theta$                       d)  $\sin \theta$
31. The value of  $e^{i\theta} - e^{-i\theta}$  is  
 a)  $\sin \theta$                       b)  $2 \sin \theta$                       c)  $i \sin \theta$                       d)  $2i \sin \theta$
32. Geometrical interpretation of  $\bar{Z}$  is  
 a) reflection of Z on real axis  
 b) reflection of Z on imaginary axis  
 c) rotation of Z about origin  
 d) 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  
 a) real axis                      b) imaginary axis                      c) the line  $y = x$                       d) the line  $y = -x$
34. Which one of the following is incorrect ?  
 a)  $(\cos \theta + i \sin \theta)^n = \cos n\theta + i \sin n\theta$                       b)  $(\cos \theta - i \sin \theta)^n = \cos n\theta - i \sin n\theta$   
 c)  $(\sin \theta + i \cos \theta)^n = \sin n\theta + i \cos n\theta$                       d)  $\frac{1}{\cos \theta + i \sin \theta} = \cos \theta - i \sin \theta$
35. Polynomial equation  $P(x)=0$  admits conjugate pairs of roots only if the coefficients are  
 a) imaginary                      b) complex                      c) real                      d) either real or complex
36. Identify the correct statement  
 a) Sum of the moduli of two complex numbers is equal to their modulus of the sum  
 b) Modulus of the product of the complex numbers is equal to sum of the moduli  
 c) Arguments of the product of two complex numbers is the product of their arguments  
 d) Arguments of the product of two complex numbers is equal to the sum of their arguments
37. Which of the following is not true ?  
 a)  $\overline{z_1 + z_2} = \overline{z_1} + \overline{z_2}$                       b)  $\overline{z_1 z_2} = \overline{z_1} \overline{z_2}$                       c)  $\operatorname{Re}(z) = \frac{\bar{z} + z}{2}$                       d)  $\operatorname{Im}(z) = \frac{\bar{z} - z}{2i}$
38. If  $Z_1$  and  $Z_2$  are complex numbers then which of the following is meaningful ?

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- a)  $Z_1 < Z_2$                       b)  $Z_1 > Z_2$                       c)  $Z_1 \geq Z_2$                       d)  $Z_1 \neq Z_2$
39. Which of the following is incorrect ?  
 a)  $\operatorname{Re}(Z) \leq |Z|$                       b)  $\operatorname{Im}(Z) \leq |Z|$                       c)  $Z\bar{Z} = |Z|^2$                       d)  $\operatorname{Re}(Z) \geq |Z|$
40. Which of the following is incorrect ?  
 a)  $|Z_1 + Z_2| \leq |Z_1| + |Z_2|$                       b)  $|Z_1 - Z_2| \leq |Z_1| + |Z_2|$                       c)  $|Z_1 - Z_2| \geq |Z_1| - |Z_2|$                       d)  $|Z_1 + Z_2| \geq |Z_1| + |Z_2|$
41. Which of the following is incorrect ?  
 a)  $\bar{\bar{Z}}$  is the mirror image of  $Z$  on the real axis  
 b) The polar form of  $\bar{Z}$  is  $(r, -\theta)$   
 c)  $-Z$  is the point symmetrical to  $Z$  about the origin  
 d) The polar form of  $-Z$  is  $(-r, -\theta)$
42. Which of the following is incorrect ?  
 a) Multiplying a complex number by  $i$  is equivalent to rotating the number counter clockwise about the origin through an angle of  $90^\circ$   
 b) Multiplying a complex number by  $-i$  is equivalent to rotating the number clockwise about the origin through an angle of  $90^\circ$   
 c) Dividing a complex number by  $i$  is equivalent to rotating the number counter clockwise about the origin through an angle of  $90^\circ$   
 d) Dividing a complex number by  $i$  is equivalent to rotating the number clockwise about the origin through an angle of  $90^\circ$
43. Which of the following is incorrect regarding  $n$ th roots of unity ?  
 a) the number of distinct roots is  $n$   
 b) the roots are in G.P. with common ratio  $\operatorname{cis} \frac{2\pi}{n}$   
 c) the arguments are in A.P. with common difference  $\frac{2\pi}{n}$   
 d) product of the roots is 0 and the sum of the roots is  $\pm 1$
44. Which of the following are true?  
 i) If  $n$  is a positive integer then  $(\cos \theta + i \sin \theta)^n = \cos n\theta + i \sin n\theta$   
 ii) If  $n$  is a negative integer then  $(\cos \theta + i \sin \theta)^n = \cos n\theta - i \sin n\theta$   
 iii) If  $n$  is a fraction then  $\cos n\theta + i \sin n\theta$  is one of the values of  $(\cos \theta + i \sin \theta)^n$   
 iv) If  $n$  is a negative integer then  $(\cos \theta + i \sin \theta)^n = \cos n\theta + i \sin n\theta$   
 a) (i), (ii), (iii), (iv)                      b) (i), (iii), (iv)                      c) (i), (iv)                      d) (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, C represents  $z_1 + z_2$   
 ii) In the argand plane E represents  $z_1 z_2$  where  $OE = OA \cdot OB$  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.  
 a) (i), (ii), (iii), (iv)                      b) (i), (iii), (iv)                      c) (i), (iv)                      d) (i) only
46. If  $Z = 0$  then the  $\arg(Z)$  is  
 a) 0                      b)  $\pi$                       c)  $\frac{\pi}{2}$                       d) indeterminate



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### CHAPTER IV

01. The axis of the parabola  $y^2 = 4x$  is  
a)  $x = 0$                       b)  $y = 0$                       c)  $x = 1$                       d)  $y = 1$
02. The vertex of the parabola  $y^2 = 4x$  is  
a) (1,0)                      b) (0,1)                      c) (0,0)                      d) (0,-1)
03. The focus of the parabola  $y^2 = 4x$  is  
a) (0,1)                      b) (1,1)                      c) (0,0)                      d) (1,0)
04. The directrix of the parabola  $y^2 = 4x$  is  
a)  $y = -1$                       b)  $x = -1$                       c)  $y = 1$                       d)  $x = 1$
05. The equation of the latus rectum of  $y^2 = 4x$  is  
a)  $x = 1$                       b)  $y = 1$                       c)  $x = 4$                       d)  $y = -1$
06. The length of the L.R. of  $y^2 = 4x$  is  
a) 2                      b) 3                      c) 1                      d) 4
07. The axis of the parabola  $x^2 = -4y$  is  
a)  $y = 1$                       b)  $x = 0$                       c)  $y = 0$                       d)  $x = 1$
08. The vertex of the parabola  $x^2 = -4y$  is  
a) (0,1)                      b) (0,-1)                      c) (1,0)                      d) (0,0)
09. The focus of the parabola  $x^2 = -4y$  is  
a) (0,0)                      b) (0,-1)                      c) (0,1)                      d) (1,0)
10. The directrix of the parabola  $x^2 = -4y$  is  
a)  $x = 1$                       b)  $x = 0$                       c)  $y = 1$                       d)  $y = 0$
11. The equation of the L.R. of  $x^2 = -4y$  is  
a)  $x = -1$                       b)  $y = -1$                       c)  $x = 1$                       d)  $y = 1$
12. The length of the L.R. of  $x^2 = -4y$  is  
a) 1                      b) 2                      c) 3                      d) 4
13. The axis of the parabola  $y^2 = -8x$  is  
a)  $x = 0$                       b)  $x = 2$                       c)  $y = 2$                       d)  $y = 0$
14. The vertex of the parabola  $y^2 = -8x$  is  
a) (0,0)                      b) (2,0)                      c) (0,-2)                      d) (2,-2)
15. The focus of the parabola  $y^2 = -8x$  is  
a) (0,-2)                      b) (0,2)                      c) (-2,0)                      d) (2,0)
16. The equation of the directrix of the parabola  $y^2 = -8x$  is  
a)  $y+2 = 0$                       b)  $x-2 = 0$                       c)  $y -2 = 0$                       d)  $x+2 = 0$
17. The equation of the latus rectum of  $y^2 = -8x$  is  
a)  $y-2 = 0$                       b)  $y+2 = 0$                       c)  $x -2 = 0$                       d)  $x+2 = 0$
18. The length of the latus rectum  $y^2 = -8x$  is  
a) 8                      b) 6                      c) 4                      d) -8
19. The axis of the parabola  $x^2 = 20y$  is  
a)  $y = 5$                       b)  $x = 5$                       c)  $x = 0$                       d)  $y = 0$
20. The vertex of the parabola  $x^2 = 20y$  is  
a) (0,5)                      b) (0,0)                      c) (5,0)                      d) (0,-5)

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21. The focus of the parabola  $x^2 = 20y$  is  
 a) (0,0)                      b) (5,0)                      c) (0,5)                      d) (-5,0)
22. The equation of the directrix of the parabola  $x^2 = 20y$  is  
 a)  $y-5 = 0$                       b)  $x+5 = 0$                       c)  $x-5 = 0$                       d)  $y+5 = 0$
23. The equation of the latus rectum of the parabola  $x^2 = 20y$  is  
 a)  $x-5 = 0$                       b)  $y-5 = 0$                       c)  $y+5 = 0$                       d)  $x+5 = 0$
24. The length of the latus rectum of the parabola  $x^2 = 20y$  is  
 a) 20                      b) 10                      c) 5                      d) 4
25. If the centre of the ellipse is (2,3) one of the foci is (3,3) then the other focus is  
 a) (1,3)                      b) (-1,3)                      c) (1,-3)                      d) (-1,-3)
26. The equations of the major and minor axes  $\frac{x^2}{9} + \frac{y^2}{4} = 1$  are  
 a)  $x = 3, y = 2$                       b)  $x = -3, y = -2$                       c)  $x = 0, y = 0$                       d)  $y = 0, x = 0$
27. The equations of the major and minor axes of  $4x^2 + 3y^2 = 12$  are  
 a)  $x = \sqrt{3}, y = 2$                       b)  $x = 0, y = 0$                       c)  $x = -\sqrt{3}, y = -2$                       d)  $y = 0, x = 0$
28. The lengths of minor and major axes of  $\frac{x^2}{9} + \frac{y^2}{4} = 1$  are  
 a) 6,4                      b) 3,2                      c) 4,6                      d) 2,3
29. The lengths of major and minor axes of  $4x^2 + 3y^2 = 12$  are  
 a) 4,  $2\sqrt{3}$                       b) 2,  $\sqrt{3}$                       c)  $2\sqrt{3}, 4$                       d)  $\sqrt{3}, 2$
30. The equation of the directrices of  $\frac{x^2}{16} + \frac{y^2}{9} = 1$  are  
 a)  $y = \pm \frac{4}{\sqrt{7}}$                       b)  $x = \pm \frac{16}{\sqrt{7}}$                       c)  $x = \pm \frac{16}{7}$                       d)  $y = \pm \frac{16}{\sqrt{7}}$
31. The equation of the directrices of  $25x^2 + 9y^2 = 225$  are  
 a)  $x = \pm \frac{4}{25}$                       b)  $x = \pm \frac{25}{4}$                       c)  $y = \pm \frac{4}{25}$                       d)  $y = \pm \frac{25}{4}$
32. The equation of the latus rectum of  $\frac{x^2}{16} + \frac{y^2}{9} = 1$  are  
 a)  $y = \pm \sqrt{7}$                       b)  $x = \pm \sqrt{7}$                       c)  $x = \pm 7$                       d)  $y = \pm 7$
33. The equation of the L.R. of  $25x^2 + 9y^2 = 225$  are  
 a)  $y = \pm 5$                       b)  $x = \pm 5$                       c)  $y = \pm 4$                       d)  $x = \pm 4$
34. The length of the L.R. of  $\frac{x^2}{16} + \frac{y^2}{9} = 1$  is  
 a)  $9/2$                       b)  $2/9$                       c)  $9/16$                       d)  $16/9$
35. The length of the L.R. of  $25x^2 + 9y^2 = 225$  is  
 a)  $9/5$                       b)  $18/5$                       c)  $25/9$                       d)  $5/18$
36. The eccentricity of the ellipse  $\frac{x^2}{25} + \frac{y^2}{9} = 1$  is  
 a)  $1/5$                       b)  $3/5$                       c)  $2/5$                       d)  $4/5$
37. The eccentricity of the ellipse  $\frac{x^2}{4} + \frac{y^2}{9} = 1$  is  
 a)  $\sqrt{5}/3$                       b)  $\sqrt{3}/5$                       c)  $3/5$                       d)  $2/3$

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38. The eccentricity of the ellipse  $16x^2 + 25y^2 = 400$  is  
 a)  $4/5$                                       b)  $3/5$                                       c)  $3/4$                                       d)  $2/5$
39. Centre of the ellipse  $\frac{x^2}{25} + \frac{y^2}{9} = 1$  is  
 a) (0,0)                                      b) (5,0)                                      c) (3,5)                                      d) (0,5)
40. The centre of the ellipse  $\frac{x^2}{4} + \frac{y^2}{9} = 1$  is  
 a) (0,3)                                      b) (2,3)                                      c) (0,0)                                      d) (3,0)
41. The foci the ellipse  $\frac{x^2}{25} + \frac{y^2}{9} = 1$  are  
 a)  $(0, \pm 5)$                                       b)  $(0, \pm 4)$                                       c)  $(\pm 5, 0)$                                       d)  $(\pm 4, 0)$
42. The foci of the ellipse  $\frac{x^2}{4} + \frac{y^2}{9} = 1$  are  
 a)  $(\pm 5, 0)$                                       b)  $(0, \pm \sqrt{5})$                                       c)  $(0, \pm 5)$                                       d)  $(\pm \sqrt{5}, 0)$
43. The foci of the ellipse  $16x^2 + 25y^2 = 400$  are  
 a)  $(\pm 3, 0)$                                       b)  $(0, \pm 3)$                                       c)  $(0, \pm 5)$                                       d)  $(\pm 5, 0)$
44. The vertices of the ellipse  $\frac{x^2}{25} + \frac{y^2}{9} = 1$  are  
 a)  $(0, \pm 5)$                                       b)  $(0, \pm 3)$                                       c)  $(\pm 5, 0)$                                       d)  $(\pm 3, 0)$
45. The vertices of the ellipse  $\frac{x^2}{4} + \frac{y^2}{9} = 1$  are  
 a)  $(0, \pm 3)$                                       b)  $(\pm 2, 0)$                                       c)  $(\pm 3, 0)$                                       d)  $(0, \pm 2)$
46. The vertices of the ellipse  $16x^2 + 25y^2 = 400$  are  
 a)  $(0, \pm 4)$                                       b)  $(\pm 5, 0)$                                       c)  $(\pm 4, 0)$                                       d)  $(0, \pm 5)$
47. If the centre of the ellipse is (4,-2) and one of the foci is (4,2) then the other focus is  
 a) (4,6)                                      b) (6,-4)                                      c) (4,-6)                                      d) (6,4)
48. The equations of transverse and conjugate axes of the hyperbola  $\frac{x^2}{9} - \frac{y^2}{4} = 1$  are  
 a)  $x = 2$  ;  $y = 3$                                       b)  $y = 0$  ;  $x = 0$                                       c)  $x = 3$  ;  $y = 2$                                       d)  $x = 0$  ;  $y = 0$
49. The equations of transverse and conjugate axes of the hyperbola  $16y^2 - 9x^2 = 144$  are  
 a)  $y = 0$  ;  $x = 0$                                       b)  $x = 3$  ;  $y = 4$                                       c)  $x = 0$  ;  $y = 0$                                       d)  $y = 3$  ;  $x = 4$
50. The equations of transverse and conjugate axes of the hyperbola  $144x^2 - 25y^2 = 3600$  are  
 a)  $y = 0$  ;  $x = 0$                                       b)  $x = 12$  ;  $y = 5$                                       c)  $x = 0$  ;  $y = 0$                                       d)  $x = 5$  ;  $y = 12$
51. The equation of transverse and conjugate axes of the hyperbola  $8y^2 - 2x^2 = 16$  are  
 a)  $x = 2\sqrt{2}$  ;  $y = \sqrt{2}$                                       b)  $x = \sqrt{2}$  ;  $y = 2\sqrt{2}$   
 c)  $x = 0$  ;  $y = 0$                                       d)  $y = 0$  ;  $x = 0$
52. The equations of the directrices of the hyperbola  $\frac{x^2}{9} - \frac{y^2}{4} = 1$  are  
 a)  $y = \pm \frac{9}{\sqrt{13}}$                                       b)  $x = \pm \frac{13}{9}$                                       c)  $y = \pm \frac{\sqrt{13}}{9}$                                       d)  $x = \pm \frac{9}{\sqrt{13}}$
53. The equations of the directrices of the hyperbola  $16y^2 - 9x^2 = 144$  are  
 a)  $x = \pm \frac{5}{9}$                                       b)  $y = \pm \frac{9}{5}$                                       c)  $x = \pm \frac{9}{5}$                                       d)  $y = \pm \frac{5}{9}$

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54. The equation of the L.R's of the hyperbola  $\frac{x^2}{9} - \frac{y^2}{4} = 1$  are  
 a)  $y = \pm 13$                       b)  $y = \pm \sqrt{13}$                       c)  $x = \pm 13$                       d)  $x = \pm \sqrt{13}$
55. The equations of the L.R's of the hyperbola  $16y^2 - 9x^2 = 144$  are  
 a)  $y = \pm 5$                       b)  $x = \pm 5$                       c)  $y = \pm \sqrt{5}$                       d)  $x = \pm \sqrt{5}$
56. The length of the L.R. of  $\frac{x^2}{9} - \frac{y^2}{4} = 1$  is  
 a)  $4/3$                       b)  $8/3$                       c)  $3/2$                       d)  $9/4$
57. The eccentricity of the hyperbola  $\frac{y^2}{9} - \frac{x^2}{25} = 1$  is  
 a)  $34/3$                       b)  $5/3$                       c)  $\sqrt{34}/3$                       d)  $\sqrt{34}/5$
58. The centre of the hyperbola  $25x^2 - 16y^2 = 400$  is  
 a) (0,4)                      b) (0,5)                      c) (4,5)                      d) (0,0)
59. The foci of the hyperbola  $\frac{y^2}{9} - \frac{x^2}{25} = 1$  are  
 a)  $(0, \pm\sqrt{34})$                       b)  $(\pm 34, 0)$                       c)  $(0, \pm 34)$                       d)  $(\pm\sqrt{34}, 0)$
60. The vertices of the hyperbola  $25x^2 - 16y^2 = 400$  are  
 a)  $(0, \pm 4)$                       b)  $(\pm 4, 0)$                       c)  $(0, \pm 5)$                       d)  $(\pm 5, 0)$
61. The equation of the tangent at (3,-6) to the parabola  $y^2 = 12x$  is  
 a)  $x - y - 3 = 0$                       b)  $x + y - 3 = 0$                       c)  $x - y + 3 = 0$                       d)  $x + y + 3 = 0$
62. The equation of the tangent at (-3,1) to the parabola  $x^2 = 9y$  is  
 a)  $3x - 2y - 3 = 0$                       b)  $2x - 3y + 3 = 0$                       c)  $2x + 3y + 3 = 0$                       d)  $3x + 2y + 3 = 0$
63. The equation of chord of contact of tangents from the point (-3, 1) to the parabola  $y^2 = 8x$  is  
 a)  $4x - y - 12 = 0$                       b)  $4x + y + 12 = 0$                       c)  $4y - x - 12 = 0$                       d)  $4y - x + 12 = 0$
64. The equation of chord of contact of tangents from (2,4) to the ellipse  $2x^2 + 5y^2 = 20$  is  
 a)  $x - 5y + 5 = 0$                       b)  $5x - y + 5 = 0$                       c)  $x + 5y - 5 = 0$                       d)  $5x - y - 5 = 0$
65. The equation of chord of contact of tangents from (5,3) to the hyperbola  $4x^2 - 6y^2 = 24$  is  
 a)  $9x + 10y + 12 = 0$                       b)  $10x + 9y - 12 = 0$                       c)  $9x - 10y + 12 = 0$                       d)  $10x - 9y - 12 = 0$
66. The combined equation of the asymptotes to the hyperbola  $36x^2 - 25y^2 = 900$  is  
 a)  $25x^2 + 36y^2 = 0$                       b)  $36x^2 - 25y^2 = 0$                       c)  $36x^2 + 25y^2 = 0$                       d)  $25x^2 - 36y^2 = 0$
67. Find the angle between the asymptotes of the hyperbola  $24x^2 - 8y^2 = 27$  is  
 a)  $\frac{\pi}{3}$                       b)  $\frac{\pi}{3}$  or  $\frac{2\pi}{3}$                       c)  $\frac{2\pi}{3}$                       d)  $\frac{-2\pi}{3}$
68. The point of contact of the tangent  $y = mx + c$  and the parabola  $y^2 = 4ax$  is  
 a)  $\left(\frac{a}{m^2}, \frac{2a}{m}\right)$                       b)  $\left(\frac{2a}{m^2}, \frac{a}{m}\right)$                       c)  $\left(\frac{a}{m}, \frac{2a}{m^2}\right)$                       d)  $\left(\frac{-a}{m^2}, \frac{-2a}{m}\right)$
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  
 a)  $\left(\frac{b^2}{c}, \frac{a^2m}{c}\right)$                       b)  $\left(\frac{-a^2m}{c}, \frac{b^2}{c}\right)$                       c)  $\left(\frac{a^2m}{c}, \frac{-b^2}{c}\right)$                       d)  $\left(\frac{-a^2m}{c}, \frac{-b^2}{c}\right)$
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

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a)  $\left(\frac{am^2}{c}, \frac{b^2}{c}\right)$       b)  $\left(\frac{a^2m}{c}, \frac{b^2}{c}\right)$       c)  $\left(\frac{-a^2m}{c}, \frac{-b^2}{c}\right)$       d)  $\left(\frac{-am^2}{c}, \frac{-b^2}{c}\right)$

71. The true statements of the following are  
 i) Two tangents and 3 normal can be drawn to a parabola from a point  
 ii) Two tangents and 4 normal can be drawn to an ellipse from a point  
 iii) Two tangents and 4 normal can be drawn to an hyperbola from a point  
 iv) Two tangents and 4 normal can be drawn to an R.H. from a point  
 a) (i), (ii), (iii) and (iv)      b) (i), (ii) only      c) (iii), (iv) only      d) (i), (ii), and (iii)
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  
 a) -1      b) 0      c)  $\pm 1$       d)  $1/2$
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  
 a)  $-t_2$       b)  $t_2$       c)  $t_1 + t_2$       d)  $\frac{1}{t_2}$
74. The condition that the line  $lx + my + n = 0$  may be normal to the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  is  
 a)  $al^3 + 2alm^2 + m^2n = 0$       b)  $\frac{a^2}{l^2} + \frac{b^2}{m^2} = \frac{(a^2+b^2)^2}{n^2}$       c)  $\frac{a^2}{l^2} + \frac{b^2}{m^2} = \frac{(a^2-b^2)^2}{n^2}$       d)  $\frac{a^2}{l^2} - \frac{b^2}{m^2} = \frac{(a^2+b^2)^2}{n^2}$
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  
 a)  $al^3 + 2alm^2 + m^2n = 0$       b)  $\frac{a^2}{l^2} + \frac{b^2}{m^2} = \frac{(a^2+b^2)^2}{n^2}$       c)  $\frac{a^2}{l^2} + \frac{b^2}{m^2} = \frac{(a^2-b^2)^2}{n^2}$       d)  $\frac{a^2}{l^2} - \frac{b^2}{m^2} = \frac{(a^2+b^2)^2}{n^2}$
76. The condition that the line  $lx + my + x = 0$  may be a normal to the parabola  $y^2 = 4ax$  is  
 a)  $al^3 + 2alm^2 + m^2n = 0$       b)  $\frac{a^2}{l^2} + \frac{b^2}{m^2} = \frac{(a^2+b^2)^2}{n^2}$       c)  $\frac{a^2}{l^2} + \frac{b^2}{m^2} = \frac{(a^2-b^2)^2}{n^2}$       d)  $\frac{a^2}{l^2} - \frac{b^2}{m^2} = \frac{(a^2+b^2)^2}{n^2}$
77. The chord of contact of tangents from any point on the directrix of the parabola  $y^2 = 4ax$  passes through its  
 a) vertex      b) focus      c) directrix      d) 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  
 a) vertex      b) focus      c) directrix      d) 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  
 a) vertex      b) focus      c) directrix      d) latus rectum
80. The point of intersection of tangents at  $t_1$  and  $t_2$  to the parabola  $y^2 = 4ax$  is  
 a)  $(a(t_1+t_2), at_1t_2)$       b)  $(at_1t_2, a(t_1+t_2))$       c)  $(at^2, 2at)$       d)  $(at_1t_2, a(t_1-t_2))$
81. If the normal to the R.H.  $xy = c^2$  at  $t_1$  meets the curve again at  $t_2$  then  $t_1^3 t_2 =$   
 a) 1      b) 0      c) -1      d) -2
82. The locus of the point of intersection of perpendicular tangents to the parabola  $y^2 = 4ax$  is  
 a) latus rectum      b) directrix      c) tangent at the vertex      d) 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  
 a)  $x^2 + y^2 = a^2 - b^2$       b)  $x^2 + y^2 = a^2$       c)  $x^2 + y^2 = a^2 + b^2$       d)  $x = 0$

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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  
 a)  $x^2 + y^2 = a^2 - b^2$       b)  $x^2 + y^2 = a^2$       c)  $x^2 + y^2 = a^2 + b^2$       d)  $x = 0$
85. The locus of the foot of perpendicular from the focus on any tangent to the parabola  $y^2 = 4ax$  is  
 a)  $x^2 + y^2 = a^2 - b^2$       b)  $x^2 + y^2 = a^2$       c)  $x^2 + y^2 = a^2 + b^2$       d)  $x = 0$
86. The locus of point of intersection of perpendicular tangents to the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  is  
 a)  $x^2 + y^2 = a^2 - b^2$       b)  $x^2 + y^2 = a^2$       c)  $x^2 + y^2 = a^2 + b^2$       d)  $x = 0$
87. The locus of point of intersection of perpendicular tangents to the hyperbola  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$  is  
 a)  $x^2 + y^2 = a^2 - b^2$       b)  $x^2 + y^2 = a^2$       c)  $x^2 + y^2 = a^2 + b^2$       d)  $x = 0$
88. The condition that the line  $lx + my + n = 0$  may be a tangent to the parabola  $y^2 = 4ax$  is  
 a)  $a^2l^2 + b^2m^2 = n^2$       b)  $am^2 = ln$       c)  $a^2l^2 - b^2m^2 = n^2$       d)  $4c^2lm = n^2$
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  
 a)  $a^2l^2 + b^2m^2 = n^2$       b)  $am^2 = ln$       c)  $a^2l^2 - b^2m^2 = n^2$       d)  $4c^2lm = n^2$
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  
 a)  $a^2l^2 + b^2m^2 = n^2$       b)  $am^2 = ln$       c)  $a^2l^2 - b^2m^2 = n^2$       d)  $4c^2lm = n^2$
91. The condition that the line  $lx + my + n = 0$  may be a tangent to the rectangular hyperbola  $xy = c^2$  is  
 a)  $a^2l^2 + b^2m^2 = n^2$       b)  $am^2 = ln$       c)  $a^2l^2 - b^2m^2 = n^2$       d)  $4c^2lm = n^2$
92. The foot of a perpendicular from a focus of the hyperbola on an asymptote lies on the -----  
 a) Centre      b) corresponding directrix      c) vertex      d) L.R.

### CHAPTER V

01. Let "h" be the height of the tank. Then the rate of change of pressure "p" of the tank with respect to height is  
 a)  $\frac{dh}{dt}$       b)  $\frac{dp}{dt}$       c)  $\frac{dh}{dp}$       d)  $\frac{dp}{dh}$
02. If the temperature  $\theta^\circ\text{C}$  of the certain metal rod of "l" meters is given by  $l = 1 + 0.00005\theta + 0.0000004\theta^2$  then the rate of change of  $l$  in  $\text{m}/\text{C}^\circ$  when the temperature is  $100^\circ\text{C}$  is  
 a)  $0.00013 \text{ m}/\text{C}^\circ$       b)  $0.00023 \text{ m}/\text{C}^\circ$       c)  $0.00026 \text{ m}/\text{C}^\circ$       d)  $0.00033 \text{ m}/\text{C}^\circ$
03. The following graph gives the functional relationship between distance and time of a moving car in  $\text{m}/\text{sec}$ . The speed of the car is  
 a)  $\frac{x}{t} \text{ m/s}$       b)  $\frac{t}{x} \text{ m/s}$       c)  $\frac{dx}{dt} \text{ m/s}$       d)  $\frac{dt}{dx} \text{ m/s}$
04. The distance – time relationship of a moving body is given by  $y = F(t)$  then the acceleration of the body is the  
 a) gradient of the velocity / time graph      b) gradient of the distance / time graph  
 c) gradient of the acceleration / distance graph      d) gradient of the velocity / distance graph
05. 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  
 a)  $(-4\text{m}/\text{s}^2, 4\text{m}/\text{s})$       b)  $(4\text{m}/\text{s}, -4\text{m}/\text{s}^2)$       c)  $(0, 0)$       d)  $(18.25\text{m}/\text{s}, 23\text{m}/\text{s}^2)$
06. The angular displacement of a fly wheel in radius is given by  $\theta = 9t^2 - 2t^3$ . The time when the angular acceleration zero is  
 a) 2.5 s      b) 3.5 s      c) 1.5 s      d) 4.5 s

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07. Food pockets were dropped from an helicopter during the flood and distance fallen in " t " seconds is given by  $y = \frac{1}{2}gt^2$  ( $g = 9.8 \text{ m/s}^2$ ). Then the speed of the food pocket after it has fallen for " 2 " seconds is
- a) 19.6 m / sec                      b) 9.8 m / sec                      c) - 19.6 m / sec                      d) - 9.8 m / sec
08. An object dropped from the sky follows the law of motion  $x = \frac{1}{2}gt^2$  ( $g = 9.8 \text{ m/s}^2$ ). The acceleration of the object when  $t = 2$  is
- a) - 9.8 m/sec<sup>2</sup>                      b) 9.8 m/sec<sup>2</sup>                      c) 19.6 m/sec<sup>2</sup>                      d) - 19.6 m/sec<sup>2</sup>
09. 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 missiles is
- a) 100m                      b) 150 m                      c) 250 m                      d) 200m
10. A continuous graph  $y = f(x)$  is such that  $f'(x) \rightarrow \infty$  as  $x \rightarrow x_1$ , at  $(x_1, y_1)$  Then  $y = f(x)$  has a
- a) vertical tangent  $y = x_1$                       b) horizontal tangent  $x = x_1$   
 c) vertical tangent  $x = x_1$                       d) horizontal tangent  $y = y_1$
11. The curve  $y = f(x)$  and  $y = g(x)$  cut orthogonally if at the point of intersection
- a) slope of  $f(x) =$  slope of  $g(x)$                       b) slope of  $f(x) +$  slope of  $g(x) = 0$   
 c) slope of  $f(x) /$  slope of  $g(x) = -1$                       d) [ slope of  $f(x)$  ] [ slope of  $g(x)$  ] = -1
12. The law of the mean can also be put in the form
- a)  $f(a+h) = f(a) - hf'(a+\theta h)$                        $0 < \theta < 1$                       b)  $f(a+h) = f(a) + hf'(a+\theta h)$                        $0 < \theta < 1$   
 c)  $f(a+h) = f(a) + hf'(a-\theta h)$                        $0 < \theta < 1$                       d)  $f(a+h) = f(a) - hf'(a-\theta h)$                        $0 < \theta < 1$
13. L' Hopital's rule cannot be applied to  $\frac{x+1}{x+3}$  as  $x \rightarrow 0$  because  $f(x) = x+1$  and  $g(x) = x+3$  are
- a) not continuous                      b) not differentiable  
 c) not in the indeterminate form as  $x \rightarrow 0$                       d) in the indeterminate form as  $x \rightarrow 0$
14. If  $\lim_{x \rightarrow a} g(x) = b$  and  $f$  is continuous at  $x = b$  then
- a)  $\lim_{x \rightarrow a} g(f(x)) = f\left(\lim_{x \rightarrow a} g(x)\right)$                       b)  $\lim_{x \rightarrow a} f(g(x)) = f\left[\lim_{x \rightarrow a} g(x)\right]$   
 c)  $\lim_{x \rightarrow a} f(g(x)) = g\left(\lim_{x \rightarrow a} f(x)\right)$                       d)  $\lim_{x \rightarrow a} f(g(x)) \neq f\left(\lim_{x \rightarrow a} g(x)\right)$
15.  $\lim_{x \rightarrow 0} \frac{x}{\tan x}$  is
- a) 1                      b) - 1                      c) 0                      d)  $\infty$
16.  $f$  is a real valued function defined on an interval  $I \subset \mathbb{R}$  ( $\mathbb{R}$  being the set of real numbers increased on  $I$ ). Then
- a)  $f(x_1) \leq f(x_2)$  whenever  $x_1 < x_2$   $x_1, x_2 \in I$                       b)  $f(x_1) \geq f(x_2)$  whenever  $x_1 < x_2$   $x_1, x_2 \in I$   
 c)  $f(x_1) \leq f(x_2)$  whenever  $x_1 > x_2$   $x_1, x_2 \in I$                       d)  $f(x_1) > f(x_2)$  whenever  $x_1 > x_2$   $x_1, x_2 \in I$
17. If a real valued differentiable function  $y = f(x)$  defined on an open interval  $I$  is increasing then
- a)  $\frac{dy}{dx} > 0$                       b)  $\frac{dy}{dx} \geq 0$                       c)  $\frac{dy}{dx} < 0$                       d)  $\frac{dy}{dx} \leq 0$
18.  $f$  is a differentiable function defined on an interval  $I$  with positive derivative. Then  $f$  is
- a) increasing on  $I$                       b) decreasing on  $I$                       c) strictly increasing on  $I$                       d) strictly decreasing on  $I$
19. The function  $f(x) = x^3$  is
- a) increasing                      b) decreasing                      c) strictly decreasing                      d) strictly increasing
20. If the gradient of a curve changes from positive just before  $P$  to negative just after then "  $P$  " is a
- a) minimum point                      b) maximum point                      c) inflection point                      d) discontinuous point





- b) Initial acceleration means acceleration at  $t = 0$   
 c) If the motion is upwards, at the maximum height, the velocity is not zero  
 d) 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)  
 i) If the two lines are perpendicular then  $m_1 m_2 = -1$   
 ii) If  $m_1 m_2 = -1$  then the two lines are perpendicular  
 iii) If  $m_1 = m_2$  then the two lines are parallel  
 iv) If  $m_1 = -\frac{1}{m_2}$  then the two lines are perpendicular
- a) (ii), (iii) and (iv)                      b) (i), (ii) and (iv)                      c) (iii) and (iv)                      d) (i) and (ii)
36. One of the conditions of Rolle's theorem is  
 a)  $f$  is defined and continuous on  $(a, b)$                       b)  $f$  is differentiable on  $[a, b]$   
 c)  $f(a) = f(b)$                       d)  $f$  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  
 a) one root between  $a$  and  $b$  for  $f'(x) = 0$                       b) two roots between  $a$  and  $b$  for  $f'(x) = 0$   
 c) one root between  $a$  and  $b$  for  $f''(x) = 0$                       d) 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 at least one  $c$  in  
 a)  $[a, b]$  such that  $f'(c) = 0$                       b)  $(a, b)$  such that  $f'(c) = 0$   
 c)  $(a, b)$  such that  $\frac{f(b)-f(a)}{b-a} = 0$                       d)  $(a, b)$  such that  $\frac{f(b)-f(a)}{b-a} = f'(c)$
39. In the law of mean, the value of ' $\theta$ ' satisfies the condition  
 a)  $\theta > 0$                       b)  $\theta < 0$                       c)  $\theta < 1$                       d)  $0 < \theta < 1$
40. Which of the following statements are correct?  
 i) Rolle's theorem is a particular case of Lagranges law of mean  
 ii) Lagranges law of mean is a particular case of generalized law of mean (Cauchy)  
 iii) Lagranges law of mean is a particular case of Rolle's theorem.  
 iv) Generalized law of mean is a particular case of Lagranges law of mean.
- a) (ii), (iii)                      b) (iii), (iv)                      c) (i), (ii)                      d) (i), (iv)

**CHAPTER VI**

01. For the function  $y = x^3 + 2x^2$  the value of  $dy$  when  $x = 2$  and  $dx = 0.1$  is  
 a) 1                      b) 2                      c) 3                      d) 4
02. If  $U = x^4 + y^3 + 3x^2y^2 + 3x^2y$  then  $\frac{\partial U}{\partial x}$  is  
 a)  $4x^3 + 6xy^2 + 6xy$                       b)  $3x^4 + 6x^2y + 3xy^2$                       c)  $4x^3 - 6x^2y + 6xy^2$                       d)  $4x^3 + 6x^2y^2 + 3xy$
03. If  $u = f(x, y)$  then with usual notations,  $u_{xy} = u_{yx}$  if  
 a)  $u$  is continuous                      b)  $u_x$  is continuous                      c)  $u_y$  is continuous                      d)  $u, u_x, u_y$  are continuous
04. If  $u = f(x, y)$  is a differentiable function of  $x$  and  $y$ ;  $x$  and  $y$  are differentiable functions of  $t$  then  
 a)  $\frac{du}{dt} = \frac{\partial f}{\partial x} \cdot \frac{dx}{dt} + \frac{\partial f}{\partial y} \cdot \frac{dy}{dt}$                       b)  $\frac{du}{dt} = \frac{\partial f}{\partial x} \cdot \frac{dx}{dt} + \frac{\partial f}{\partial y} \cdot \frac{dy}{dt}$                       c)  $\frac{du}{dt} = \frac{\partial f}{\partial x} \cdot \frac{dx}{dt} + \frac{\partial f}{\partial y} \cdot \frac{dy}{dt}$                       d)  $\frac{\partial u}{\partial t} = \frac{\partial f}{\partial x} \cdot \frac{\partial x}{\partial t} + \frac{\partial f}{\partial y} \cdot \frac{\partial y}{\partial t}$
05. If  $f(x, y)$  is a homogeneous functions of degree  $n$  then  $x \frac{\partial f}{\partial x} + y \frac{\partial f}{\partial y} =$   
 a)  $f$                       b)  $nf$                       c)  $n(n-1)f$                       d)  $n(n+1)f$

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06. If  $u(x, y) = x^4 + y^3 + 3x^2y^2 + 3x^2y$  then  $\frac{\partial^2 u}{\partial x \partial y}$  is  
 a)  $12xy + 6x$                       b)  $12xy - 6x$                       c)  $12x^2y - 6x$                       d)  $12xy^2 - 6x$
07. If  $u(x, y) = x^4 + y^3 + 3x^2y^2 + 3x^2y$  then  $\frac{\partial^2 u}{\partial y \partial x}$  is  
 a)  $12xy + 6x$                       b)  $12xy - 6x$                       c)  $12x^2y - 6x$                       d)  $12xy^2 - 6x$
08. If  $u(x, y) = x^4 + y^3 + 3x^2y^2 + 3x^2y$  then  $\frac{\partial^2 u}{\partial x^2}$  is  
 a)  $3y^2 + 6x^2y + 3x^2$                       b)  $6y + 6x^2$                       c)  $12x^2y - 6x$                       d)  $12x^2 + 6y^2 + 6y$
09. If  $u(x, y) = x^4 + y^3 + 3x^2y^2 + 3x^2y$  then  $\frac{\partial^2 u}{\partial y^2}$  is  
 a)  $6y + 6x^2$                       b)  $12xy - 6x$                       c)  $12x^2y - 6x$                       d)  $3y^2 + 6x^2y + 3x^2$
10. The differential on y of the function  $y = \sqrt[4]{x}$  is  
 a)  $\frac{1}{4} x^{-3/4}$                       b)  $\frac{1}{4} x^{-3/4} dx$                       c)  $x^{-3/4} dx$                       d) 0
11. The differential of y if  $y = x^5$  is  
 a)  $5x^4$                       b)  $5x^4 dx$                       c)  $5x^5 dx$                       d)  $5x^5$
12. The differential of y if  $y = \sqrt{x^4 + x^2 + 1}$  is  
 a)  $\frac{1}{2}(4x^3 + 2x)^{-\frac{1}{2}} dx$                       b)  $\frac{1}{2}(x^4 + x^2 + 1)^{-\frac{1}{2}} (4x^3 + 2x) dx$   
 c)  $\frac{1}{2}(4x^3 + 2x)^{\frac{1}{2}}$                       d)  $\frac{1}{2}(x^4 + x^2 + 1)^{-\frac{1}{2}} (4x^3 + 2x)$
13. The differential of y if  $y = \frac{x-2}{2x+3}$  is  
 a)  $\frac{-7}{(2x+3)^2} dx$                       b)  $\frac{1}{(2x+3)^2} dx$                       c)  $\frac{7}{(2x+3)^2} dx$                       d)  $\frac{7}{(2x+3)^2}$
14. The differential of y if  $y = \sin 2x$  is  
 a)  $2 \cos 2x$                       b)  $2 \cos 2x \cdot dx$                       c)  $-2 \cos 2x \cdot dx$                       d)  $\cos 2x \cdot dx$
15. The differential of  $x \tan x$  is  
 a)  $(x \sec^2 x + \tan^2 x)$                       b)  $(x \sec^2 x - \tan x) dx$                       c)  $x \sec^2 x dx$                       d)  $(x \sec^2 x + \tan x) dx$
16. If  $u(x, y) = x^4 + y^3 + 3x^2y^2 + 3x^2y$  then  $\frac{\partial u}{\partial y}$  is  
 a)  $3y^2 + 6xy + 3x^2$                       b)  $3y^2 + 6xy^2 + 3x^2$                       c)  $3y^2 + 6x^2y + 3x^2$                       d)  $3y^2 + 6x^2y^2 + 3x^2$
17. The curve  $y^2 = x^2(1-x^2)$  is defined only for  
 a)  $x \leq 2$  and  $x \geq -2$                       b)  $x \leq 1$  and  $x \geq -1$                       c)  $x \leq -1$  and  $x \geq 1$                       d)  $x < 1$  and  $x > -1$
18. The curve  $y^2 = x^2(1-x^2)$  is symmetrical about  
 a) x-axis only                      b) y-axis only                      c) a and y axes only                      d) x, y axes and the origin
19. The curve  $y^2 = x^2(1-x^2)$  has  
 a) only one loop between  $x = 0$  and  $x = 1$                       b) two loops between  $x = -1$  and  $x = 0$   
 c) two loops between  $x = -1$  and  $0$ ;  $0$  and  $1$                       d) no loop
20. The curve  $y^2 = x^2(1-x^2)$  has  
 a) an asymptote  $x = -1$                       b) an asymptote  $x = 1$   
 c) two asymptotes  $x = 1$  and  $x = -1$                       d) no asymptote

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21. The curve  $y^2(2+x) = x^2(6-x)$  exists for  
 a)  $-2 < x \leq 6$                       b)  $-2 \leq x \leq 6$                       c)  $-2 < x < 6$                       d)  $-2 \leq x < 6$
22. The x-intercept of the curve  $y^2(2+x) = x^2(6-x)$  is  
 a) 0    b) 6, 0    c) 2    d) -2
23. The asymptote to the curve  $y^2(2+x) = x^2(6-x)$  is  
 a)  $x = 2$                                       b)  $x = -2$                                       c)  $x = 6$                                       d)  $x = -6$
24. The curve  $y^2(2+x) = x^2(6-x)$  has  
 a) only one loop between  $x = 0$  and  $x = 6$     b) two loops between  $x = 0$  and  $x = 6$   
 c) only one loop between  $x = -2$  and  $x = 6$     d) two loops between  $x = -2$  and  $x = 6$
25. The curve  $y^2 = x^2(1-x)$  is defined only for  
 a)  $x \leq 1$                                       b)  $x \geq 1$                                       c)  $x < 1$                                       d)  $x > 1$
26. The curve  $y^2 = x^2(1-x)$  is symmetrical about  
 a) y-axis only                                      b) x-axis only                                      c) both the axes                                      d) origin only
27. The curve  $y^2 = x^2(1-x)$  has  
 a) an asymptote  $y = 0$                       b) an asymptote  $x = 1$                       c) an asymptote  $y = 1$                       d) no asymptote
28. The curve  $y^2 = x^2(1-x)$  has  
 a) only one loop between  $x = -1$  and  $x = 0$     b) only one loop between  $x = 0$  and  $x = 1$   
 c) two loops between  $x = -1$  and  $x = 1$     d) no loop
29. The curve  $y^2 = (x-a)(x-b)^2$   $a, b > 0$  and  $a > b$  does not exist for  
 a)  $x \geq a$                                       b)  $x = b$                                       c)  $b < x < a$                                       d)  $x = a$
30. The curve  $y^2 = (x-a)(x-b)^2$  is symmetrical about  
 a) origin only                                      b) y-axis only                                      c) x-axis only                                      d) both x and y-axis
31. The curve  $y^2 = (x-a)(x-b)^2$   $a, b > 0$  and  $a > b$  has  
 a) an asymptote  $x = a$                       b) an asymptote  $x = b$                       c) an asymptote  $y = a$                       d) no asymptote
32. The curve  $y^2 = (x-a)(x-b)^2$   $a, b > 0$  and  $a > b$  has  
 a) a loop between  $x = a$  and  $x = b$     b) two loops between  $x = a$  and  $x = b$   
 c) two loops between  $x = 0$  and  $x = b$     d) no loop
33. The curve  $y^2(1+x) = x^2(1-x)$  is defined for  
 a)  $-1 \leq x \leq 1$                                       b)  $-1 < x \leq 1$                                       c)  $-1 \leq x < 1$                                       d)  $-1 < x < 1$
34. The curve  $y^2(1+x) = x^2(1-x)$  is symmetrical about  
 a) both the axes                                      b) origin only                                      c) y-axis only                                      d) x-axis only
35. The asymptote to the curve  $y^2(1+x) = x^2(1-x)$  is  
 a)  $x = 1$     b)  $y = 1$     c)  $y = -1$     d)  $x = -1$
36. The curve  $y^2(1+x) = x^2(1-x)$  has  
 a) a loop between  $x = -1$  and  $x = 1$     b) a loop between  $x = -1$  and  $x = 0$   
 c) a loop between  $x = 0$  and  $x = 1$     d) no loop
37. The curve  $a^2y^2 = x^2(a^2 - x^2)$  is defined for  
 a)  $x \leq a$  and  $x \geq -a$                       b)  $x < a$  and  $x > -a$                       c)  $x \leq -a$  and  $x \geq a$                       d)  $x \leq a$  and  $x > -a$
38. The curve  $a^2y^2 = x^2(a^2 - x^2)$  is symmetrical about  
 a) x-axis only                                      b) y-axis only                                      c) both the axes                                      d) both the axes and origin
39. The curve  $a^2y^2 = x^2(a^2 - x^2)$  has  
 a) an asymptote  $x = a$                       b) an asymptote  $x = -a$                       c) an asymptote  $x = 0$                       d) no asymptote



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- a)  $2 \int_0^a f(x) dx$       b)  $\int_a^b f(a-x) dx$       c)  $\int_a^b f(b-x) dx$       d)  $\int_a^b f(a+b-x) dx$
09. If  $n$  is a positive integer then  $\int_0^{\infty} x^n e^{-ax} dx =$
- a)  $\frac{n!}{a^n}$       b)  $\frac{n+1!}{a^n}$       c)  $\frac{n+1!}{a^{n+1}}$       d)  $\frac{n!}{a^{n+1}}$
10. If  $n$  is odd then  $\int_0^{\pi/2} \cos^n x dx$
- a)  $\frac{n}{n-1} \cdot \frac{n-2}{n-3} \cdot \frac{n-4}{n-5} \dots \frac{\pi}{2}$       b)  $\frac{n-1}{n} \cdot \frac{n-3}{n-2} \cdot \frac{n-5}{n-4} \dots \frac{1}{2} \frac{\pi}{2}$   
 c)  $\frac{n}{n-1} \cdot \frac{n-2}{n-3} \cdot \frac{n-4}{n-5} \dots \frac{3}{2} \cdot 1$       d)  $\frac{n-1}{n} \cdot \frac{n-3}{n-2} \cdot \frac{n-5}{n-4} \dots \frac{2}{3} \cdot 1$
11. If  $n$  is even then  $\int_0^{\pi/2} \sin^n x dx$  is
- a)  $\frac{n}{n-1} \cdot \frac{n-2}{n-3} \cdot \frac{n-4}{n-5} \dots \frac{\pi}{2}$       b)  $\frac{n-1}{n} \cdot \frac{n-3}{n-2} \cdot \frac{n-5}{n-4} \dots \frac{1}{2} \frac{\pi}{2}$   
 c)  $\frac{n}{n-1} \cdot \frac{n-2}{n-3} \cdot \frac{n-4}{n-5} \dots \frac{3}{2} \cdot 1$       d)  $\frac{n-1}{n} \cdot \frac{n-3}{n-2} \cdot \frac{n-5}{n-4} \dots \frac{2}{3} \cdot 1$
12. If  $n$  is even then  $\int_0^{\pi/2} \cos^n x dx$  is
- a)  $\frac{n}{n-1} \cdot \frac{n-2}{n-3} \cdot \frac{n-4}{n-5} \dots \frac{\pi}{2}$       b)  $\frac{n-1}{n} \cdot \frac{n-3}{n-2} \cdot \frac{n-5}{n-4} \dots \frac{1}{2} \frac{\pi}{2}$   
 c)  $\frac{n}{n-1} \cdot \frac{n-2}{n-3} \cdot \frac{n-4}{n-5} \dots \frac{3}{2} \cdot 1$       d)  $\frac{n-1}{n} \cdot \frac{n-3}{n-2} \cdot \frac{n-5}{n-4} \dots \frac{2}{3} \cdot 1$
13. If  $n$  is odd then  $\int_0^{\pi/2} \sin^n x dx$  is
- a)  $\frac{n}{n-1} \cdot \frac{n-2}{n-3} \cdot \frac{n-4}{n-5} \dots \frac{\pi}{2}$       b)  $\frac{n-1}{n} \cdot \frac{n-3}{n-2} \cdot \frac{n-5}{n-4} \dots \frac{1}{2} \frac{\pi}{2}$   
 c)  $\frac{n}{n-1} \cdot \frac{n-2}{n-3} \cdot \frac{n-4}{n-5} \dots \frac{3}{2} \cdot 1$       d)  $\frac{n-1}{n} \cdot \frac{n-3}{n-2} \cdot \frac{n-5}{n-4} \dots \frac{2}{3} \cdot 1$
14.  $\int_a^b f(x) dx =$
- a)  $-\int_a^b f(x) dx$       b)  $-\int_b^a f(x) dx$       c)  $-\int_a^b f(x) dx$       d)  $2 \int_a^b f(x) dx$
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
- a)  $\int_c^d x dx$       b)  $\int_c^d x dy$       c)  $\int_c^d y dy$       d)  $\int_c^d x dy$
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
- a)  $\pi \int_c^d x^2 dy$       b)  $\pi \int_c^d x^2 dx$       c)  $\pi \int_c^d y^2 dx$       d)  $\pi \int_c^d y^2 dy$
17. The area bounded by the curve  $x = f(y)$  to the left of  $y$ -axis between the lines  $y = c$  and  $y = d$  is
- a)  $\int_c^d x dy$       b)  $-\int_c^d x dy$       c)  $\int_c^d y dx$       d)  $-\int_c^d y dx$
18. The arc length of the curve  $y = f(x)$  from  $x = a$  to  $x = b$  is
- a)  $\int_a^b \sqrt{1 + \left(\frac{dy}{dx}\right)^2} dx$       b)  $\int_c^d \sqrt{1 + \left(\frac{dx}{dy}\right)^2} dx$       c)  $2\pi \int_a^b y \sqrt{1 + \left(\frac{dy}{dx}\right)^2} dx$       d)  $2\pi \int_a^b y \sqrt{1 + \left(\frac{dx}{dy}\right)^2} dx$

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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

a)  $\int_a^b \sqrt{1 + \left(\frac{dy}{dx}\right)^2} dx$       b)  $\int_c^d \sqrt{1 + \left(\frac{dx}{dy}\right)^2} dx$       c)  $2\pi \int_a^b y \sqrt{1 + \left(\frac{dy}{dx}\right)^2} dx$       d)  $2\pi \int_a^b y \sqrt{1 + \left(\frac{dx}{dy}\right)^2} dx$

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

a)  $\frac{6!}{4^6}$       b)  $\frac{6!}{4^5}$       c)  $\frac{5!}{4^6}$       d)  $\frac{5!}{4^5}$

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

a)  $\frac{m!}{7^m}$       b)  $\frac{7!}{m^7}$       c)  $\frac{m!}{7^{m+1}}$       d)  $\frac{7!}{m^8}$

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

a)  $\frac{6!}{2^7}$       b)  $\frac{6!}{2^6}$       c)  $2^6 6!$       d)  $2^7 6!$

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

a)  $-\frac{1}{n} \cos^{n-1} x \sin x + \frac{n-1}{n} I_{n-2}$       b)  $\cos^{n-1} x \sin x + \frac{n-1}{n} I_{n-2}$   
 c)  $\frac{1}{n} \cos^{n-1} x \sin x - \frac{n-1}{n} I_{n-2}$       d)  $\frac{1}{n} \cos^{n-1} x \sin x + \frac{n-1}{n} I_{n-2}$

### CHAPTER VIII

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

a) 3, 1      b) 1, 3      c) 3, 5      d) 2, 3

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

a) 2, 1      b) 1, 2      c) 1, 2      d) 2, 2

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

a) 2, 1      b) 1, 2      c) 2, 4      d) 4, 2

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

a) 2, 1      b) 1, 2      c) 2, 2      d) 1, 1

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

a) 1, 1      b) 1, 2      c) 2, 1      d) 0, 1

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

a) 2, 1      b) 1, 1      c) 1, 0      d) 0, 1

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

a) 2, 2      b) 2, 1      c) 1, 2      d) 3, 1

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08. The order and degree of the differential equation are  $\frac{d^2 y}{dx^2} + x = \sqrt{y + \frac{dy}{dx}}$
- a) 2,1                                      b) 1,2                                      c) 2 , 1 /2                                      d) 2,2
09. The order and degree of the differential equation are  $\frac{d^2 y}{dx^2} - y + \left(\frac{dy}{dx} + \frac{d^3 y}{dx^3}\right)^{\frac{3}{2}} = 0$
- a) 2,3                                      b) 3,3                                      c) 3,2                                      d) 2,2
10. The order and degree of the differential equation are  $y'' = (y - y')^{\frac{2}{3}}$
- a) 2,3                                      b) 3,3                                      c) 3,2                                      d) 2,2
11. The order and degree of the differential equation are  $y' + (y'')^2 = (x + y'')^2$
- a) 1,1                                      b) 1,2                                      c) 2,1                                      d) 2,2
12. The order and degree of the differential equation are  $y' + (y'')^2 = x(x + y'')^2$
- a) 2,2                                      b) 2,1                                      c) 1,2                                      d) 1,1
13. The order and degree of the differential equations are  $\left(\frac{dy}{dx}\right)^2 + x = \frac{dx}{dy} + x^2$
- a) 2,2                                      b) 2,1                                      c) 1,2                                      d) 1,3
14. The order and degree of the differential are  $\sin x (dx + dy) = \cos x (dx - dy)$
- a) 1,1                                      b) 0,0                                      c) 1,2                                      d) 2,1
15. The differential equation corresponding to  $xy = c^2$  where c is an arbitrary constants is
- a)  $xy'' + x = 0$                                       b)  $y' = 0$                                       c)  $xy' + y = 0$                                       d)  $xy'' - x = 0$
16. In finding the differential equation corresponding to  $y = e^{mx}$  where m is the arbitrary constant, then m is
- a)  $\frac{y}{y'}$                                       b)  $\frac{y'}{y}$                                       c)  $y'$                                       d)  $y$
17. The solution of a linear differential equation  $\frac{dx}{dy} + Px = Q$  where P and Q are functions of y, is
- a)  $y(I.F) = \int (I.F)Q dx + c$                                       b)  $x(I.F) = \int (I.F)Q dy + c$   
c)  $y(I.F) = \int (I.F) Q dy + c$                                       d)  $x(I.F) = \int (I.F)Q dx + c$
18. The solution of the linear differential equation  $\frac{dy}{dx} + Py = Q$  where P and Q are functions of x is
- a)  $y(I.F) = \int (I.F)Q dx + c$                                       b)  $x(I.F) = \int (I.F)Q dy + c$   
c)  $y(I.F) = \int (I.F) Q dy + c$                                       d)  $x(I.F) = \int (I.F)Q dx + c$
19. Identify the incorrect statement
- a) The order of a differential equation is the order of the highest derivative occurring in it.
- b) 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)
- c)  $\frac{dy}{dx} = \frac{f_1(x, y)}{f_2(x, y)}$  is the first order first degree homogeneous differential equation
- d)  $\frac{dy}{dx} + xy = e^x$  is a linear differential equation in x.

### CHAPTER IX

01. Which of the following are statements ?

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- i.Chennai is the capital of Tamil Nadu.
- iii.Rose is a flower
- a) all                                      b) (i) and (ii)
02. Which of the following are not statements ?
- i. Three plus four is eight
- iii. Switch on the light
- a) (i) and (ii)                              b) (ii) and (iii)
03. The truth values of the following statements are
- i. Ooty is in Tamilnadu and  $3 + 4 = 8$
- iii. Ooty is in Kerala and  $3 + 4 = 7$
- a) F,T,F,F                                  b) F,F,F,T
04. The truth values of the following statements are
- i) Chennai is in India or  $\sqrt{2}$  is an integer.
- iii) Chennai is in China or  $\sqrt{2}$  is an integer
- a) T F T F                                  b) T F F T
05. Which of the following are not statements ?
- i. All natural numbers are integers.
- iii. The sky is blue
- a) (iv) only                                  b) (i) and (ii)
06. Which of the following are statements?
- i.  $7 + 2 < 10$
- iii. How beautiful you are
- (a) (iii) (iv)                                  b) (i) , (ii)
07. The truth values of the following statements are
- i. All the sides of a rhombus are equal in length
- iii. Milk is white
- a) T T T F                                  b) T T T T
08. The truth values of the following statements are
- i) Paris is in France                              ii)  $\sin x$  is an even function
- iii) Every square matrix is non-singular      iv) Jupiter is a planet
- a) T F F T                                  b) F T F T                                  c) F T T F                                  d) F F T T
09. 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
- a)  $p \vee q$                                   b)  $p \wedge q$                                   c)  $\sim p$                                   d)  $\sim p \vee q$
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
- a)  $\sim p \wedge \sim q$                                   b)  $p \wedge \sim q$                                   c)  $\sim p \wedge q$                                   d)  $p \wedge q$
11. If p is true and q is unknown then
- a)  $\sim p$  is true                                  b)  $p \vee (\sim p)$  is false                                  c)  $p \wedge (\sim p)$  is true                                  d)  $p \vee q$  is true
12. If p is true and q is false then which of the following statements is not true ?
- a)  $p \rightarrow q$  is false                                  b)  $p \vee q$  is true                                  c)  $p \wedge q$  is false                                  d)  $p \leftrightarrow q$  is true
13. Which of the following is not true?
- i) Negation of a negation of a statement is the statement itself
- ii.The earth is a planet.
- iv.Every triangle is an isosceles triangle
- c) (ii) and (iii)                                  d) (iv) only
- ii. The sun is a planet
- iv. Where are you going ?
- c) (iii) and (iv)                                  d) (iv) only
- ii. Ooty is in Tamilnadu and  $3 + 4 = 7$
- iv. Ooty is in Kerala and  $3 + 4 = 8$
- c) T,T,F,F                                  d) T,F,T,F
- ii) Chennai is in India or  $\sqrt{2}$  is an irrational number
- iv) Chennai is in China or  $\sqrt{2}$  is an irrational number
- c) F T F T                                  d) T T F T
- ii. A square has five sides
- iv. How are you ?
- c) (i) (ii) and (iii)                                  d) (iii) and (iv)
- ii. The set of rational numbers is finite
- iv. Wish you all success.
- c) (i) , (iii)                                  d) (ii) , (iv)
- ii.  $1 + \sqrt{19}$  is an irrational number
- iv. The number 30 has four prime factors.
- c) T F T F                                  d) F T T T



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- ii) If the last column of its truth table contain only T then it is tautology  
 iii) If the last column of its truth table contains only F then it is contradiction  
 iv) If p and q are any two statements then  $p \leftrightarrow q$  is a tautology
14. Which of the following are binary operation on R?  
 i)  $a * b = \min\{a, b\}$  ii)  $a * b = \max\{a, b\}$  iii)  $a * b = a$  iv)  $a * b = b$   
 a) all b) (i), (ii) and (iii) c) (ii), (iii) and (iv) d) (iii), (iv)
15. '+' is not a binary operation on  
 a) N b) Z c) C d)  $Q - \{0\}$
16. '-' is a binary operation on  
 a) N b)  $Q - \{0\}$  c)  $R - \{0\}$  d) Z
17. '÷' is a binary operation on  
 a) N b) R c) Z d)  $C - \{0\}$
18. In congruence modulo 5,  $\{x \in Z / x = 5k + 2, k \in Z\}$  represents  
 a) [0] b) [5] c) [7] d) [2]
19.  $[5]_{12} \cdot [11]$  is  
 a) [55] b) [12] c) [7] d) [11]
20.  $[3]_{+8} + [7]$  is  
 a) [10] b) [8] c) [5] d) [2]
21. In the group  $(G, \cdot)$ ,  $G = \{1, -1, i, -i\}$ , the order of  $-1$  is  
 a) -1 b) 1 c) 2 d) 0
22. In the group  $(G, \cdot)$ ,  $G = \{1, -1, i, -i\}$ , the order of  $-i$  is  
 a) 2 b) 0 c) 4 d) 3
23. In the group  $(G, \cdot)$ ,  $G = \{1, \omega, \omega^2\}$ , the order of  $0(\omega^2)$  is ( where  $\omega$  is a cube root of unity)  
 a) 2 b) 1 c) 4 d) 3
24. In the group  $(Z_4, +_4)$ , order of  $[0]$  is  
 a) 1 b)  $\infty$  c) cannot be determined d) 0
25. In the group  $(Z_4, +_4)$ ,  $0([3])$  is  
 a) 4 b) 3 c) 2 d) 1
26. In  $(S, o)$ ,  $xoy = x$ ,  $x, y \in S$  then 'o' is  
 a) only associative b) only commutative  
 c) associative and commutative d) neither associative nor commutative
27. In  $(N, *)$ ,  $x * y = \max\{x, y\}$ ,  $x, y \in N$  then  $(N, *)$  is  
 a) only closed b) only semi group c) only a monoid d) an infinite group
28. The set of positive even integers, with usual addition forms  
 a) a finite group b) only a semi group c) only a monoid d) an infinite group
29. The set of positive even numbers, with usual addition forms  
 a) a finite group b) only a semi group c) only a monoid d) an infinite group
30. In  $(Z_5 - \{[0]\}, \cdot_5)$  the order of  $0([3])$  is  
 a) 5 b) 3 c) 4 d) 2
31. In the group  $(G, \cdot)$ ,  $G = \{1, -1, i, -i\}$ , the order of 1 is  
 a) 2 b) 0 c) 4 d) 1
32. In the group  $(G, \cdot)$ ,  $G = \{1, -1, i, -i\}$ , the order of i is

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33. In the group  $(G, \cdot)$ ,  $G = \{1, \omega, \omega^2\}$ ,  $\omega$  is cube root of unity then  $O(\omega)$  is  
a) 2                                      b) 0                                      c) 4                                      d) 3
34. In the group  $(G, \cdot)$ ,  $G = \{1, \omega, \omega^2\}$ ,  $\omega$  is cube root of unity then  $O(1)$  is  
a) 2                                      b) 1                                      c) 4                                      d) 3
35. In the group  $(Z_4, +_4)$ ,  $O([1])$  is  
a) 2                                      b) 1                                      c) 4                                      d) 3
36. In the group  $(Z_4, +_4)$ ,  $O([2])$  is  
a) 1                                      b)  $\infty$                                       c) can not be determined      d) 4
37. In  $(Z_5 - \{0\}, \cdot_5)$  the order of  $O([2])$  is  
a) 1                                      b) 2                                      c) can not be determined      d) 0
38. In  $(Z_5 - \{0\}, \cdot_5)$  the order of  $O([4])$  is  
a) 5                                      b) 3                                      c) 4                                      d) 2
39. In  $(Z_5 - \{0\}, \cdot_5)$  the order of  $O([1])$  is  
a) 5                                      b) 3                                      c) 4                                      d) 2
- a) 1                                      b) 2                                      c) 3                                      d) 4

### CHAPTER X

01. A discrete random variable takes  
a) only a finite number of values                                      b) all possible values between certain given limits  
c) infinite number of values    d) a finite or countable number of values
02. A continuous random variable takes  
a) only a finite number of values                                      b) all possible values between certain given limits  
c) infinite number of values    d) a finite or countable number of values
03. If X is a discrete random variable then  $P(X \geq a) =$   
a)  $P(X < a)$                                       b)  $1 - P(X \leq a)$                                       c)  $1 - P(X < a)$                                       d) 0
04. If X is a continuous random variable then  $P(X \geq a) =$   
a)  $P(X < a)$                                       b)  $1 - P(X > a)$                                       c)  $P(X > a)$                                       d)  $1 - P(X \leq a - 1)$
05. If X is a continuous random variable then  $P(a < X < b) =$   
a)  $P(a \leq X \leq b)$                                       b)  $P(a < X \leq b)$                                       c)  $P(a \leq X < b)$                                       d) all the three above
06. A continuous random variable X has p.d.f.  $f(x)$  then  
a)  $0 \leq f(x) \leq 1$                                       b)  $f(x) \geq 0$                                       c)  $f(x) \leq 1$                                       d)  $0 < f(x) < 1$
07. A discrete random variable X has probability, mass function  $p(x)$ , then  
a)  $0 \leq p(x) \leq 1$                                       b)  $p(x) \geq 0$                                       c)  $p(x) \leq 1$                                       d)  $0 < p(x) < 1$
08. Mean and variance of binomial distribution are  
a)  $nq, npq$                                       b)  $np, \sqrt{npq}$                                       c)  $np, np$                                       d)  $np, npq$
09. Which of the following is or are correct regarding normal distribution curve?  
i) Symmetrical about the line  $X = \mu$  ( mean )                                      ii) Mean = median = mode  
iii) Unimodal    iv) Point of inflexion are at  $X = \mu \pm \sigma$   
a) (i), (ii) only                                      b) (ii), (iv) only                                      c) (i), (ii), (iii) only                                      d) all
10. For a standard normal distribution the mean and variance are  
a)  $\mu, \sigma^2$                                       b)  $\mu, \sigma$                                       c) 0,1                                      d) 1,1
11. The p.d.f of the standard normal variate Z is  $\phi(z) =$   
a)  $\frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{1}{2}z^2}$                                       b)  $\frac{1}{\sqrt{2\pi}} e^{-z^2}$                                       c)  $\frac{1}{\sqrt{2\pi}} e^{\frac{1}{2}z^2}$                                       d)  $\frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}z^2}$

## +2 MATH COME BOOK-CREATIVE ONE MARK QUESTIONS

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12. If  $X$  is a discrete random variable then which of the following is correct?  
a)  $0 \leq F(x) < 1$   
b)  $F(-\infty) = 0$  and  $F(\infty) \leq 1$   
c)  $P[X = x_n] = F(x_n) - F(x_n - 1)$   
d)  $F(x)$  is a constant function
13. If  $X$  is a continuous random variable then which of the following is incorrect?  
a)  $F'(x) = f(x)$   
b)  $F(\infty) = 1$  ;  $F(-\infty) = 0$   
c)  $P[a \leq x \leq b] = F(b) - F(a)$   
d)  $P[a \leq x < b] \neq F(b) - F(a)$
14. Which of the following are correct?  
i)  $E(aX + b) = aE(X) + b$   
ii)  $\mu_2 = \mu_2' - (\mu_1')^2$   
iii)  $\mu_2 = \text{variance}$   
iv)  $\text{var}(aX + b) = a^2 \text{var}(X)$   
a) all  
b) (i) , (ii) , (iii)  
c) (ii) , (iii)  
d) (i) , (iv)
15. Which of the following is not true regarding the normal distribution?  
a) skewness is zero  
b) Mean = median = mode  
c) the Points of inflection are at  $X = \mu \pm \sigma$   
d) maximum height of the curve is  $\frac{1}{\sqrt{2\pi}}$