1. Which of the following are corrct?

(i) $|A^{-1}|=\frac{1}{|A|}$ (ii) $(A^T)^{-1}=(A^{-1})^T$ (iii) $(\lambda A^{-1})=\frac{1}{\lambda}A^{-1},\lambda\neq 0$ $(\lambda A)^{-1}=\frac{1}{\lambda}A^{-1}$, $\lambda\neq 0$

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

2. Which of the following are incorrect?

(i) A is non singular and $AB=AC\Rightarrow B=C$

(ii) A is non singular and $BA=CA\Rightarrow B=C$

(iii) A and B are non singular of same order then $(AB)^{-1}=B^{-1}A^{-1}$

(iv) A is non singular then $A=(A^{-1})^{-1}$

(1) none (2) (i) and (ii) (3) (ii) and (iii) (4) (iii) and (iv)

3. Which of the following is incorrect?

(1) $adj(adj\,A)=|A|^{n-2}A$ (2) $|adjA|=A^{n-1}$

(3) $|adj(adjA)|=|A|^{(n-1)^2}$ (4) $(adjA)^T=adj(A^T)$

4. A is of order n, $\lambda\neq 0$ then $adj(\lambda A)=$

(1) $\lambda^{n-1}adj(A)$ (2) $\lambda^{n-2}adj(A)$ (3) $\frac{1}{\lambda}adj(A)$ (4) $\lambda^{n}adj(A)$

5. If A is a n, non singular matrix then $[adj(A)]^{-1}$ is

(1) $\neq adj(A^{-1})$ and $=\frac{1}{|A|}A$ (2) $=adj(A^{-1})$ and $\neq\frac{1}{|A|}A$

(3) $\neq adj(A^{-1})$ and $\neq\frac{1}{|A|}A$ (4) $=adj(A^{-1})$ and $=\frac{1}{|A|}A$

6. Consider the statements :

A : A is symmetric $\Rightarrow$ $adjA$ is symmetric

B : $adj(AB)=adj(A)\cdot adj(B)$

Choose the correct option

(1) Both statements are correct (2) Neither statements are correct

(3) A is correct, B is incorrect (4) A is incorrect, B is correct

7. A is orthogonal and consider the statements and select the suitable option :

A : $A^{-1}=A^T$

B : $AA^T=A^TA=I$

(1) A and B are true (2) A only true

(3) B only true (4) both are false

8. Which of the following are correct in the case of a rank of a matrix A of order $m \times n$?

(i) rank of I_n is n

(ii) A is of order $m \times n$ then $\rho(A) \leq \min(m,n)$

(iii) The necessary and sufficient condition to find inverse of an $n \times n$ matrix is $\rho(A) = n$

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

9. In the case of Cramer's rule which of the following are correct?

(i) $\Delta = 0$ (ii) $\Delta \neq 0$

(iii) the system has unique solution (iv) the system has infinitely many solutions

(1) (i) and (iv) (2) (ii) and (iii) (3) all (4) none

10. If ρ represents the rank and, A and B are $n \times n$ matrices, then

(1) $\rho(A+B) = \rho(A) + \rho(B)$ (2) $\rho(AB) = \rho(A)\rho(B)$

(3) $\rho(A-B) = \rho(A) - \rho(B)$ (4) $\rho(A+B) \leq n$

CHAPTER 2

1. If $\sqrt{-1} = i$ and $n \in \mathbb{N}$ then

(1) $i^{4n+3} = -i$ (2) $i^{8n+2} = 1$ (3) $i^{100n+4} = -1$ (4) $i^{4n+5} = 1$

2. Which of the statement is incorrect if $i = \sqrt{-1}$ and z is any complex number?

(1) iz is obtained by rotating z in the anti clockwise direction through an angle $\frac{\pi}{2}$

(2) iz is obtained by rotating z in the clockwise direction through an angle $\frac{\pi}{2}$

(3) $-z$ is obtained by rotating z in the anti clockwise direction through an angle π.

(4) $-iz$ is obtained by rotating z in the clockwise direction through an angle $\frac{\pi}{2}$.

3. Find the correct statements.

(i) Conjugate of the sum of two complex numbers is equal to the sum of their conjugates.

(ii) Conjugate of the difference of two complex numbers is equal to the difference of their conjugates.

(iii) Conjugate of the product of two complex numbers is equal to the product of their conjugates.

(iv) Conjugate of the quotient of two complex numbers is equal to the quotient of their conjugates.

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

4. Identify the incorrect statement.

(1) $|z|^2 = 1 \Rightarrow \frac{1}{z} = \overline{z}$ (2) $\text{Re}(z) \leq |z|$

(3) $||z_1| - |z_2|| \geq |z_1 + z_2|$ (4) $|z^n| = |z|^n$

5. If $|z-z_1|=|z-z_2|$, the locus of z is

(1) the perpendicular bisector of line joining z_1 and z_2

(2) a line parallel to the line joining the points z_1 and z_2

(3) a circle, where z_1 and z_2 are the end points of a diameter

(4) a line joining z_1 and z_2.

6. Which of the following are correct statements?

(i) $e^{-i\theta}=\cos\theta-i\sin\theta$ (ii) $e^{i\frac{\pi}{2}}=i$

(iii) $e^{i(x+iy)}=e^{-y}(\cos x+i\sin x)$ (iv) $e^{-i(y-ix)}=e^{-x}(\cos y-i\sin y)$

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

7. Which of the following are correct?

(i) $\arg(z_1+z_2)=\arg(z_1)+\arg(z_2)$ (ii) $\arg(z_1-z_2)=\arg(z_1)-\arg(z_2)$

(iii) $\arg(z_1z_2)=\arg(z_1)+\arg(z_2)$ (iv) $\arg\left(\frac{z_1}{z_2}\right)=\arg(z_1)-\arg(z_2)$

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

8. Which of the following are incorrect?

(i) $(\cos\theta+i\sin\theta)^m=\cos m\theta+i\sin m\theta$ if m is a negative integer

(ii) $(\sin\theta+i\cos\theta)^n=\cos n\left(\frac{\pi}{2}-\theta\right)+i\sin n\left(\frac{\pi}{2}-\theta\right)$

(iii) $(\cos\theta-i\sin\theta)^{-m}=\cos m\theta+i\sin m\theta$ if m is a negative integer

(iv) $(\cos\theta-i\sin\theta)^n=\cos n\theta-i\sin n\theta$

(1) none (2) (i) and (iv) (3) (i) and (ii) (4) (iii) and (iv)

9. In the case n^{th} roots of unity, identify the correct statements.

(i) the roots are in G.P

(ii) sum of the roots is zero

(iii) Product of the roots is $(-1)^{n+1}$

(iv) the roots are lying on a unit circle

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

10. $cis\frac{28}{5}\pi$ is equal to

(1) $cis\left(-\frac{2\pi}{5}\right)$ (2) $cis\left(\frac{2\pi}{5}\right)$ (3) $cis\left(\frac{3\pi}{5}\right)$ (4) $cis\left(-\frac{3\pi}{5}\right)$

CHAPTER 3

1. The statement "A polynomial equation of degree n has exactly n roots which are either real or complex" is

(1) Fundamental theorem of Algebra (2) Rational root theorem

(3) Descartes rule (4) Complex conjugate root theorem

2. Identify the correct answer regarding the statements

Statement A : If a complex number z_0 is a root of $p(x)=0$ then $\overline{z}_0$ is also a root.

Statement B : For a polynomial equation with real coefficients, complex (imaginary) roots occur in conjugate pairs

(1) Both are true (2) Both are false

(3) A is false, B is true (4) A is false, B is true

3. If $p+\sqrt{q}$ and $-i\sqrt{q}$ are the roots of a polynomial equation with rational coefficients then the least possible degree of the equation is

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

4. If $\frac{p}{q}$ (where p and q are co-primes), is a root of a polynomial equation $a_n x^n + a_{n-1}x^{n-1} + \cdots + a_0 = 0$, then identify the correct option.

Statement A : p is a factor of a_0 and q is a factor of a_n.

Statement B : q is a factor of a_0 and p is a factor of a_n.

(1) both are not true (2) both are true

(3) A is correct but B is false (4) A is incorrect but B is correct

5. A polynomial $p(x)$ of degree n is said to be a reciprocal polynomial if

(1) either $p(x)=x^n p\left(\frac{1}{x}\right)$ or $p(x)=-x^n p\left(\frac{1}{x}\right)$

(2) $p(x)=x^n p\left(\frac{1}{x}\right)$ and $p(x)=-x^n p\left(\frac{1}{x}\right)$

(3) either $p(x)=p\left(\frac{1}{x}\right)$ or $p(x)=p\left(-\frac{1}{x}\right)$

(4) $p(x)=p\left(\frac{1}{x}\right)$ and $p(x)=p\left(-\frac{1}{x}\right)$

6. Regarding Descarte's Rule, which of the following are true, where s_1, s_2 are the number of sign changes in $p(x)$ and $p(-x)$ respectively.

(i) the number of positive zeros $> s_1$ (ii) the number of positive zeros $\leq s_1$

(iii) the number of negative zeros $\leq s_2$ (iv) the total number of zeros $= s_1 + s_2$

(1) (ii) and (iii) only (2) (i) and (iv) (3) all (4) none

CHAPTER 4

1. e^{x} is a periodic function with period
   (1) 0 (2) π (3) 2π (4) 4π

2. $\sin^2 x + \cos x$ is
   (1) an odd function (2) an even function
   (3) neither odd nor even (4) either even or odd

3. If $y = a\sin bx$ then the amplitude and period are respectively
   (1) $a, \frac{2\pi}{b}$ (2) $|b|, \frac{2\pi}{|a|}$ (3) $|a|, \frac{2\pi}{|b|}$ (4) $b, \frac{2\pi}{a}$

4. $\sin(\sin^{-1} x) = x$ if
   (1) $|x| \le 1$ (2) $|x| \ge 1$ (3) $|x| < 1$ (4) $|x| \le \frac{\pi}{2}$

5. $\sin^{-1}(\sin x) = x$ if
   (1) $|x| \le \frac{\pi}{2}$ (2) $|x| < \frac{\pi}{2}$ (3) $|x| \ge \frac{\pi}{2}$ (4) $|x| \le 1$

6. $\cos(\cos^{-1} x) = x$ if
   (1) $|x| < 1$ (2) $|x| \le 1$ (3) $|x| \ge 1$ (4) $|x| = 0$

7. $\cos^{-1}(\cos x) = x$ if
   (1) $-\frac{\pi}{2} \le x \le \frac{\pi}{2}$ (2) $0 < x \le \pi$ (3) $0 \le x \le \pi$ (4) $-1 \le x \le 1$

8. The amplitude and period of $y = a\tan bx$ are respectively
   (1) $|a|, \frac{\pi}{|b|}$ (2) $a, \frac{\pi}{b}$ (3) not defined, $\frac{\pi}{|b|}$ (4) not defined, $\frac{\pi}{b}$

9. The domain of $\operatorname{cosec}^{-1} x$ function is
   (1) $\mathbb{R} \setminus (-1,1)$ (2) $\mathbb{R} \setminus \{-1,1\}$ (3) $\left[-\frac{\pi}{2}\ \frac{\pi}{2}\right]$ (4) $\mathbb{R} - \{0\}$

10. The domain of secant function and $\sec^{-1} x$ function are respectively
   (1) $[0\ \pi] \setminus \left\{\frac{\pi}{2}\right\}$ and $\mathbb{R} \setminus (-1,1)$ (2) $\mathbb{Z} \setminus (-1,1)$ and $(0\ \pi] \setminus \left\{\frac{\pi}{2}\right\}$
   (3) $[0\ \pi] \setminus \left\{\frac{\pi}{2}\right\}$ and $\{-1,1\}$ (4) $\mathbb{Z} \setminus \{-1,1\}$ and $(0\ \pi] \setminus \left\{\frac{\pi}{2}\right\}$

CHAPTER 5

1. If the point (a,b) satisfies the inequality $x^2 + y^2 + 2gx + 2fy + c < 0$ then (a,b)
   (1) lies within the circle (2) lie on the circle
   (3) lie outside the circle (4) can't be determined

2. The number of tangents to the circle from inside the circle is

(1) 2 real (2) 0 (3) 2 imaginary (4) can't be determined

3. Which of the following are correct about parabola?

(i) axis of the parabola is axis of symmetry

(ii) vertex is the point of intersection of the axis and the parabola

(iii) latus rectum is a focal chord perpendicular to the axis

(iv) length of latus rectum is 4 times the distance between focus and vertex

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

4. For the equation $Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$ if $B^2 - 4AC = 0$,

(1) $e = 1$ and represents parabola (2) $e = 0$ and represents parabola

(3) $e = 1$ and represents a circle (4) $e = 0$ and represents a circle

5. For the parabola $(x-h)^2 = -4a(y-k)$, the equation of the directrix is

(1) $y = k$ (2) $y = a$ (3) $x = k + a$ (4) $y = k + a$

6. For the ellipse $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1,\ a < b$

(1) $e = \sqrt{1 - \frac{b^2}{a^2}} < 1$ (2) $e = \sqrt{1 - \frac{b^2}{a^2}} > 1$

(3) $e = \sqrt{1 - \frac{a^2}{b^2}} < 1$ (4) $e = \sqrt{1 + \frac{a^2}{b^2}} < 1$

7. Which of the statements are correct?

(i) The sum of the focal distances of any point on the ellipse is equal to length of major axis.

(ii) The difference of the focal distances of any point on the hyperbola is equal to the length of its transverse axis

(iii) The values of a and b decide the type of ellipse.

(iv) The values of a and b do not decide the type of the hyperbola

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

8. In the general equation $Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$, if $A = C = F$ and $B = D = E = 0$ then the curve represents

(1) parabola (2) hyperbola (3) circle or ellipse (4) none of the above

9. If $y = mx + c$ is a tangent to the parabola $y^2 = 4ax$ then the point of contact is

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

10. Equation of any tangent to the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ is of the form

(1) either $y=mx+\sqrt{a^2m^2-b^2}$ or $y=mx-\sqrt{a^2m^2-b^2}$

(2) either $y=mx+\sqrt{a^2m^2-b^2}$ and $y=mx-\sqrt{a^2m^2-b^2}$

(3) either $y=mx+\sqrt{a^2m^2+b^2}$ or $y=mx-\sqrt{a^2m^2+b^2}$

(4) either $y=mx+\sqrt{a^2m^2+b^2}$ and $y=mx-\sqrt{a^2m^2+b^2}$

11. $y=mx+c$ is a tangent to the parabola $y^2=4ax$ then

(1) $c=\frac{a}{m}$ (2) $c=\frac{m}{a}$ (3) $c^2=a^2m^2+m^2$ (4) $m=c$

12. If $y=mx+c$ is a tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ then

(1) $c^2=a^2m^2+b^2$ (2) $b^2=c^2+a^2m^2$ (3) $c^2=a^2m^2+m^2$ (4) $c^2=a^2m^2-b^2$

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

CHAPTER 6

1. Which one is meaningful?

(1) $(\vec{a}\times\vec{b})\times(\vec{b}\cdot\vec{c})$ (2) $\vec{a}\times(5+\vec{b})$ (3) $(\vec{a}\cdot\vec{b})\times(\vec{c}\cdot\vec{d})$ (4) $(\vec{a}\times\vec{b})\cdot(\vec{c}\times\vec{d})$

2. With usual notation which one is not equal to $\vec{a}\cdot(\vec{b}\times\vec{c})$?

(1) $-\vec{a}\cdot(\vec{c}\times\vec{b})$ (2) $\vec{c}\cdot(\vec{b}\times\vec{a})$ (3) $-\vec{b}\cdot(\vec{c}\times\vec{a})$ (4) $(\vec{c}\times\vec{a})\cdot\vec{b}$

3. Identify the correct statements.

(i) If three vectors are coplanar then their scalar triple product is 0.

(ii) If scalar triple product of three vectors is 0 then they are coplanar

(iii) If $\vec{p}=x_1\vec{a}+y_1\vec{b}+z_1\vec{c}$

$\vec{q}=x_2\vec{a}+y_2\vec{b}+z_2\vec{c}$

$\vec{r}=x_3\vec{a}+y_3\vec{b}+z_3\vec{c}$, and $\vec{a},\vec{b},\vec{c}$ are coplanar then $\vec{p},\vec{q},\vec{r}$ are coplanar

(iv) $\vec{a},\vec{b},\vec{c}$ and $\vec{d}$ are coplanar then $(\vec{a}\times\vec{b})\times(\vec{c}\times\vec{d})=\vec{0}$

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

4. The non-parametric form of vector equation of a straight line passing through a point whose position vector is $\vec{a}$ and parallel to $\vec{u}$ is

(1) $\vec{r}=\vec{a}+t\vec{u}$ (2) $\vec{r}=\vec{u}+t\vec{a}$ (3) $(\vec{r}-\vec{u})\times\vec{a}=\vec{0}$ (4) $(\vec{r}-\vec{a})\times\vec{u}=\vec{0}$

5. Which one of the following is insufficient to find the equation of a straight line?

(1) two points on the line

(2) one point on the line and direction ratios of one parallel line

(3) one point on the line and direction ratios of its perpendicular line

(4) a perpendicular line and a parallel line in Cartesian form.

6. Which of the following statement is incorrect?

(1) if two lines are coplanar then their direction ratios must be same

(2) two coplanar lines must lie in a plane

(3) skew lines are neither parallel nor intersecting

(4) if two lines are parallel or intersecting then they are coplanar

7. The shortest distance between the two skew lines $\vec{r}=\vec{a}+t\vec{u}$ and $\vec{r}=\vec{b}+t\vec{u}$ is

(1) $\dfrac{\left|(\vec{b}-\vec{a})\cdot(\vec{u}\times\vec{v})\right|}{|\vec{u}\times\vec{v}|}$ (2) $\dfrac{\left|(\vec{b}-\vec{a})\cdot(\vec{u}\times\vec{v})\right|}{\vec{u}\times\vec{v}}$

(3) $\dfrac{\left|(\vec{b}-\vec{a})\cdot(\vec{u}\times\vec{v})\right|}{|\vec{a}\times\vec{b}|}$ (4) $\dfrac{\left|(\vec{b}-\vec{a})\cdot(\vec{u}\times\vec{v})\right|}{|\vec{a}|}$

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

(1) $[\vec{r}-\vec{u},\ \vec{u},\vec{v}]=0$ (2) $[\vec{r}-\vec{a},\ \vec{u},\vec{v}]=0$ (3) $[\vec{r}-\vec{v},\ \vec{u},\vec{v}]=0$ (4) $[\vec{r}-\vec{u},\ \vec{a},\vec{v}]=0$

9. The non-parametric form of a vector equation passing through two points whose position vectors are $\vec{a}$ and $\vec{b}$ and parallel to $\vec{u}$ is

(1) $\left[\vec{r}-\vec{u}\quad \vec{b}-\vec{a}\quad \vec{u}\right]=0$ (2) $\left[\vec{r}-\vec{a}\quad \vec{u}-\vec{a}\quad \vec{u}\right]=0$

(3) $\left[\vec{r}-\vec{u}\quad \vec{b}-\vec{a}\quad \vec{u}\right]=0$ (4) $\left[\vec{r}-\vec{a}\quad \vec{b}-\vec{a}\quad \vec{u}\right]=0$

10. Which of the following is/are false, in the case of a plane passing through three non collinear points whose position vectors are $\vec{a},\vec{b}$ and $\vec{c}$?

(i) $\left[\vec{r}-\vec{a}\quad \vec{b}-\vec{a}\quad \vec{c}-\vec{a}\right]=0$ (ii) $\left[\vec{r}-\vec{a}\quad \vec{a}-\vec{b}\quad \vec{c}-\vec{a}\right]=0$

(iii) $\left[\vec{r}-\vec{a}\quad \vec{b}-\vec{a}\quad \vec{a}-\vec{c}\right]=0$ (iv) $\left[\vec{r}-\vec{a}\quad \vec{a}-\vec{b}\quad \vec{a}-\vec{c}\right]=0$

(1) (ii) and (iii) (2) (iii) and (iv) (3) all (4) none

11. With usual notations which of the following are correct?

(i) angle between $\vec{r}\cdot\vec{n}_1 = p_1$ and $\vec{r}\cdot\vec{n}_2 = p_2$ is related by $\cos\theta = \left|\dfrac{\vec{n}_1\cdot\vec{n}_2}{|\vec{n}_1|\,|\vec{n}_2|}\right|$

(ii) angle between $\vec{r} = \vec{a} + t\vec{u}$ and the plane $\vec{r}\cdot\vec{n} = p$ is related by $\sin\theta = \dfrac{|\vec{u}\cdot\vec{n}|}{|\vec{u}|\,|\vec{n}|}$

(iii) the distance between a point with position vector $\vec{u}$ and the plane $\vec{r}\cdot\vec{n} = p$ is $\dfrac{|\vec{u}\cdot\vec{n} - p|}{|\vec{n}|}$

(iv) the angle between $\vec{r} = \vec{a} + s\vec{u}$ and $\vec{r} = \vec{b} + t\vec{v}$ is related by $\cos\theta = \dfrac{\vec{u}\cdot\vec{v}}{|\vec{u}|\,|\vec{v}|}$

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

12. Suppose you are given two lines which are lying in the required plane. In how many ways one can find the equation of the plane?

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

13. What will be happened when finding the distance between two skew lines becomes zero?

(1) they are intersecting lines (2) they are perpendicular lines
(3) parallel lines (4) neither parallel nor intersecting

14. The shortest distance between $\vec{r} + \vec{a} + s\vec{u}$ and $\vec{r} = \vec{b} + t\vec{u}$ is

(1) $\dfrac{|(\vec{b}-\vec{a})\times\vec{u}|}{|\vec{u}|}$ (2) $\dfrac{(\vec{b}-\vec{a})\times\vec{u}}{|\vec{u}|}$ (3) $\dfrac{(\vec{b}-\vec{a})\times\vec{u}}{\vec{a}}$ (4) $\dfrac{(\vec{b}-\vec{a})\times\vec{u}}{\vec{b}}$

CHAPTER 7

1. If $ax^2 + by^2 = 1$ and $a_1x^2 + b_1y^2 = 1$ intersect each other orthogonally then which one is incorrect?

(1) $\frac{1}{a} - \frac{1}{b} = \frac{1}{a_1} - \frac{1}{b_1}$ (2) $\frac{1}{a} - \frac{1}{a_1} = \frac{1}{b} - \frac{1}{b_1}$ (3) $\frac{1}{a} + \frac{1}{b_1} = \frac{1}{b} + \frac{1}{a_1}$ (4) $\frac{1}{a} - \frac{1}{b_1} = \frac{1}{b} - \frac{1}{a_1}$

2. "Let $f(x)$ be continuous on $[a,b]$ and differentiable in (a,b). If $f(a) = f(b)$ then there exists atleast one point $c \in (a,b)$ such that $f'(c) = 0$". This statement is

(1) Intermediate value theorem (2) Rolles theorem
(3) Lagrange mean value theorem (4) Taylors theorem

3. Lagrange mean value theorem becomes Rolles theorem if

(1) $f(b) = f(a)$ (2) $f'(b) = f'(a)$ (3) $f(a) = 0$ (4) $f(b) = 0$

4. For the function $f(x) = \sin x,\ x \in \left[0, \frac{\pi}{2}\right]$, Rolles theorem is not applicable, since

(1) not continuous in $\left[0, \frac{\pi}{2}\right]$ (2) not differentiable in $\left(0, \frac{\pi}{2}\right)$

(3) $f(0) \neq f\left(\frac{\pi}{2}\right)$ (4) $f'(x)$ does not exist at $x = 0$

5. Lagrange mean value theorem, constant c for the function $y=\cos x$ in $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$ is

(1) 1 (2) -1 (3) not exist **(4) 0**

6. Rolles constant c for the function $f(x)=|x|,\ x\in[-1\ 1]$ is

(1) 0 (2) 1 (3) -1 **(4) not existing**

7. The Maclaurin's series is obtained from the Taylors series by putting

(1) $x=a$ (2) $x=0$ **(3) $a=0$** (4) $a=n$

8. l'H ôpital's Rule is not applicable for the limit tends to

(1) $\frac{0}{0}$ (2) $\infty-\infty$ (3) $\frac{\infty}{\infty}$ **(4) 1°**

9. "If $f(x)$ is continuous on $[a,b]$ then f has both absolute maximum and absolute minimum in $[a\ b]$". This statement is

(1) Extreme value theorem (2) Intermediate value theorem

(3) Lagrange mean value theorem (4) Taylors theorem

10. For the function $f(x)$, critical numbers are obtained by solving :

(1) $f'(x)=0$ if $f'(x)$ exists; and the values of x for which $f'(x)$ does not exist

(2) $f'(x)=0$ if $f'(x)$ does not exist; and the values for which $f'(x)$ exists

(3) $f'(x)=0$ if $f'(x)$ does not exist; and the values for which $f'(x)$ does not exist

(4) $f'(x)=0$ if $f'(x)$ exists; and the values for which $f'(x)$ exists

11. Let c be a critical number for $f(x)$ then which of the following is incorrect?

(i) $f'(x)$ changes from negative to positive through c then $f(x)$ has a local minimum

(ii) $f'(x)$ changes from positive to negative through c then $f(x)$ has a local maximum

(iii) $f''(c)$ exists and $f''(c)$ changes sign through c then $(c,f(c))$ is a point of inflection.

(iv) $f''(c)$ exists at the point of inflection then $f''(c)=0$

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

12. If c is a critical point and $f'(c)=0$, further $f''(c)$ exists then which is incorrect?

(1) f has a relative maximum at c if $f''(c)<0$

(2) f has a relative minimum at c if $f''(c)>0$

(3) $f''(c)=0$, there is no information regarding relative maxima

(4) f has a relative maximum at c if $f''(c)>0$

13. The vertical asymptote of $f(x)=\frac{1}{x}$ is

(1) $x=0$ (2) $y=0$ (3) $x=c$ (4) $y=c$

14. The horizontal asymptote of $f(x)=\frac{1}{x}$ is

(1) $y=0$ (2) $x=0$ (3) $x=c$ (4) $y=c$

15. The slant asymptote of $f(x)=\frac{x^2-6x+7}{x+5}$ is

(1) $x+y+11=0$ (2) $x+y-11=0$ (3) $x=-5$ (4) $y=x-11$

16. The vertical asymptotes of $f(x)=\frac{2x^2-8}{x^2-16}$ are

(1) $y=\pm4$ (2) does not exist (3) $x=\pm16$ (4) $x=\pm4$

17. The horizontal asymptote of $f(x)=\frac{2x^2-8}{x^2-6}$ is

(1) $x=2$ (2) $y=2$ (3) $y=\pm4$ (4) $y=4$

18. The vertical asymptotes of $f(x)=\frac{x^2}{x^2-1}$ are

(1) $x=\pm1$ (2) $y=\pm1$ (3) $x=0$ (4) $y=0$

19. The horizontal asymptote of $f(x)=\frac{x^2}{x^2-1}$ is

(1) $x=1$ (2) $x=\pm1$ (3) $y=1$ (4) $y=\pm1$

20. The vertical asymptote of $f(x)=\frac{x^2}{x+1}$ is

(1) $x=-1$ (2) $x=1$ (3) $y=1$ (4) $y=-1$

21. The slant asymptote of $f(x)=\frac{x^2}{x+1}$ is

(1) $y=x+1$ (2) $y=x-1$ (3) $x=y-1$ (4) $x=y$

22. The vertical asymptotes of $f(x)=\frac{3x}{\sqrt{x^2+2}}$

(1) x^2-2 (2) does not exist (3) $x=\sqrt{2}$ (4) $x=-\sqrt{2}$

23. The horizontal asymptotes of $f(x)=\frac{3x}{\sqrt{x^2+2}}$ are

(1) $y=\pm3$ (2) $x=\pm2$ (3) $y=\pm2$ (4) $y=0$

24. The vertical asymptote of $f(x)=\frac{x^2-6x-1}{x+3}$ is

(1) $x=-3$ (2) $x=3$ (3) does not exist (4) $x=\pm3$

25. The slant asymptote of $f(x)=\frac{x^2-6x-1}{x+3}$ is

(1) $y=x-9$ (2) $y=x+9$ (3) $x=y$ (4) $x+y=0$

26. The vertical asymptote of $f(x)=\frac{x^2+6x-4}{3x-6}$ is

(1) $x=2$ (2) $x=3$ (3) $y=2$ (4) $y=3$

27. The slant asymptote of $f(x)=\frac{x^2+6x-4}{3x-6}$ is

(1) $y=\frac{x}{3}-\frac{8}{3}$ (2) $y=\frac{x}{3}+\frac{8}{3}$ (3) $x=\frac{y}{3}+\frac{8}{3}$ (4) $y=\frac{x}{3}+8$

CHAPTER 8

1. Identify the incorrect statements

(i) absolute error = | Actual value − app. value |

(ii) relative error = $\frac{\text{absolute error}}{\text{actual value}}$

(iii) percentage error = relative error ×100

(iv) absolute error has unit of measurement but relative error and percentage errors are units free

(1) all (2) (i) and (ii) only (3) (i), (ii), (iii) only (4) none

2. If $f(x)>0$ for all x and $g(x)=\log(f(x))$ then dg is

(1) $\frac{1}{f(x)}f'(x)dx$ (2) $\frac{1}{x}$ (3) $\frac{1}{f(x)}dx$ (4) $\frac{1}{x}dx$

3. If f and g are differentiable functions, then $d(fg)$ is

(1) $fdg+gdf$ (2) $f\cdot df-g\cdot dg$ (3) $f\cdot df+gdg$ (4) $fdg-gdf$

4. Let $A=\{(x,y)/x,y\in\mathbb{R}\}$ and $f:A\to\mathbb{R}^2$, $f_{xy}=f_{yx}$ only if

(1) f_{xy},f_{yx} exist and continuous in A (2) f_x,f_y exist and continuous in A

(3) f_{xx},f_{yy} exist and continuous in A (4) f_{xy},f_{xx} exist and continuous in A

5. Let $A=\{(x,y)/x,y\in\mathbb{R}\}$ A function $f:A\to\mathbb{R}^2$ is said to be harmonic if

(1) $\frac{\partial^2u}{\partial x^2}+\frac{\partial^2u}{\partial y^2}=0\ \forall(x,y)\in A$ (2) $\frac{\partial^2u}{\partial x^2}-\frac{\partial^2u}{\partial y^2}=0\ \forall(x,y)\in A$

(3) $\frac{\partial^2u}{\partial x^2}\div\frac{\partial^2u}{\partial y^2}=0\ \forall(x,y)\in A$ (4) $\frac{\partial^2u}{\partial x^2}\times\frac{\partial^2u}{\partial y^2}=0\ \forall(x,y)\in A$

6. If w is a function of x and y; and x and y are functions of t, then which of the following is undefined?

(1) $\frac{\partial w}{\partial x}$ (2) $\frac{\partial w}{\partial y}$ (3) $\frac{\partial x}{\partial t}$ (4) $\frac{dy}{dt}$

7. If w is a function of x and y; and x and y are functions of s and t then which of the following are correct?

(i) $\frac{dw}{dt}$ is not defined (ii) $\frac{dx}{ds}$ is not defined

(iii) $\frac{dy}{dt}$ is not defined (iv) $\frac{\partial w}{\partial t}=\frac{\partial w}{\partial x}\frac{\partial x}{\partial t}+\frac{\partial w}{\partial y}\frac{\partial y}{\partial t}$

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

CHAPTER 9

1. If $f(x)$ is a continuous function on $[a,b]$ and $F(x)$ is an anti derivative of $f(x)$ then by second fundamental theorem of Integral Calculus $\int_a^b f(x)\,dx=$

(1) $F(b)-F(a)$ (2) $F'(b)-F'(a)$ (3) $F(a)-F(b)$ (4) 0

2. If $f(x)$ is a continuous function on $[a, b]$ and $F(x)=\int_a^x f(u)du,\ a<x<b$ then by first fundamental theorem of integral calculus $\frac{d}{dx}F(x)=$

(1) $F'(x)$ (2) $f(x)$ (3) $f'(x)$ (4) $f(x)+c$

3. $\int_a^b f(a+b-x)dx=$

(1) $f(a)-f(b)$ (2) $\int_b^a f(x)dx$ (3) 0 (4) $\int_a^b f(x)dx$

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

(1) 0 (2) $2\int_0^a f(x)dx$

(3) a (4) $\int_0^a f(x)dx+\int_0^a f(2a-x)dx$

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

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

6. If $f(2a-x)=-f(x)$ then $\int_0^{2a} f(x)dx=$

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

7. $\int_a^b [f(x)-f(a+b-x)]dx=$

(1) $f(b)(-f(a)$ (2) 0 (3) $f(b)-f(a)$ (4) 1

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

(1) 0 (2) a (3) $\frac{a}{2}$ (4) $2a$

9. If $I_{m,n} = \int_0^{\frac{\pi}{2}} \sin^m x \cos^n x dx$ then $I_{m,n} =$ (here $n \geq 2$)

(1) $\frac{n-1}{m+n} I_{m,n-2}$ (2) $\frac{n+1}{m+n} I_{m,n-2}$ (3) $\frac{n-1}{m+n} I_{m,n-1}$ (4) $\frac{n}{m+n} I_{m,n-2}$

10. If $I_{m,n} = \int_0^1 x^m (1-x)^n dx$ then $I_{m,n} =$ (here $n \geq 1$)

(1) $\frac{n}{m+n+1} \cdot I_{m,n-1}$ (2) $\frac{m}{m+n+1} \cdot I_{m,n-1}$ (3) $\frac{n}{m-n+1} \cdot I_{m,n-1}$ (4) $\frac{n}{m+n-1} \cdot I_{m,n-1}$

11. The values of $\int_0^{\infty} e^{-x} x^n dx$ and $\int_0^{\infty} e^{-x} x^{n-1} dx$ are respectively

(1) $m!$ and $(n-1)!$ (2) $(n+1)!$ and $(n-1)!$

(3) $n!$ and $(n-1)!$ (4) $n!$ and $(n+1)!$

CHAPTER – 10

1. Consider the statements

A : The order of a differential equation (D.E) is the highest order derivative present in the D.E

B : In the polynomial form of $D.E$., the degree of the D.E is the integral power of the highest order derivative.

Identify the correct option

(1) both are correct   (2) both are false

(3) A is true, B is false   (4) A is false, B is true

2. Formation of a differential equation is

(1) eliminating arbitrary constants from the given relationship by minimum number of differentiations

(2) eliminating constants from the given relationship by minimum number of differentiations

(3) eliminating arbitrary constants from the given relationship by maximum number of differentiations

(4) eliminating constants from the given relationship

3. Consider the statements :

A: The general solution of a differential equation is the solution which contains as many arbitrary constants as the order of the D.E

B: Giving particular values to the arbitrary constants in the general solution of the D.E is the particular solution.

(1) both are correct   (2) both are incorrect

(3) A is correct, B is incorrect   (4) A is incorrect, B is correct

4. An equation of the form $f_1(x)g_1(y)dx + f_2(x)g_2(y)dy = 0$ is called

(1) linear differential equation (2) homogeneous

(3) linear differential equation of first order (4) variable separable

5. A differential equation is said to be homogeneous if

(1) $\frac{dy}{dx} = g\left(\frac{y}{x}\right)$ (2) $\frac{dy}{dx} = g(x+y)$ (3) $\frac{dy}{dx} = g(xy)$ (4) $\frac{dy}{dx} = g(x-y)$

6. A first order linear differential equation is of the form

(1) $\frac{dy}{dx} + Py = Q$, where P and Q are functions of y

(2) $\frac{dx}{dy} + Py = Q$, where P and Q are functions of y

(3) $\frac{dy}{dx} + Px = Q$, where P and Q are functions of y

(4) $\frac{dy}{dx} + Py = Q$, where P and Q are functions of x

(or) $\frac{dx}{dy} + Px = Q$, where P and Q are functions of y

7. The integrating factor of $\frac{dy}{dx} + Py = Q$ is (P and Q are functions of x)

(1) $e^{\int Pdy}$ (2) $e^{\int Pdx}$ (3) $e^{\int Qdy}$ (4) $e^{\int Pdx}$

8. The integrating factor of $\frac{dx}{dy} + Px + Q$ is (P and Q are functions of y)

(1) $e^{\int Pdy}$ (2) $e^{\int Pdx}$ (3) $e^{\int Qdy}$ (4) $e^{\int Pdx}$

9. Assume that a population (x) grows or decays at a rate directly proportional to the amount of population present at that time i.e. $\frac{dx}{dt} = kx$, then

(1) $k < 0$ if it is a growth problem

(2) $k > 0$ if it is a decay problem

(3) $k < 0$ if it is a decay problem and $k > 0$ if it is a growth problem

(4) $k = 0$

10. The Newtons law of cooling ($T -$ temperature of a body at any time t, T_m temperature of the surrounding medium) says

(1) $\frac{dT}{dt} \alpha (T - T_m)$ (2) $\frac{dT}{dt} = T - T_m$ always

(3) $\frac{dT}{dt} = k(T - T_m), k$ is constant of proportionality (4) $\frac{dt}{dT} = k(T - T_m)$

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

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

12. The order and degree of the differential equation $\left(\frac{d^4y}{dx^4}\right)^3+4\left(\frac{dy}{dx}\right)^7+6y=5\cos 3x$ are

(1) 12,7 (2) 4,3 (3) 3,4 (4) 7,12

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

(1) 2, not defined (2) 3,2 (3) 2,3 (4) 2,2

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

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

15. The order and degree of the differential equation $dy+(xy-\cos x)dx=0$ are

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

16. The order and degree of the differential equation $\frac{dy}{dx}+xy=\cot x$ are

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

17. The order and degree of the differential equation $\left(\frac{d^3y}{dx^3}\right)^{\frac{2}{3}}-3\frac{d^2y}{dx^2}+5\frac{dy}{dx}+4=0$ are

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

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

(1) 2, not defined (2) 2,2 (3) 2,1 (4) 1,2

19. The order and degree of the differential equation $\sqrt{\frac{dy}{dx}}-4\frac{dy}{dx}-7x=0$ are

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

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

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

21. The order and degree of the differential equation $x^2\frac{d^2y}{dx^2}+\left[1+\left(\frac{dy}{dx}\right)^2\right]^{\frac{1}{2}}=0$ are

(1) 2,1 **(2) 2,2** (3) 1,2 (4) 1,1

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

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

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

(1) 2,1 (2) 1,2 **(3) 2, not defined** (4) 1,1

24. The order and degree of the differential equation $\frac{d^2y}{dx^2}+5\frac{dy}{dx}+\int ydx=x^3$ are

(1) 3,2 (2) 1,2 (3) 2,1 **(4) 3,1**

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

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

26. Radium decays at a rate proportional to the amount Q present. The corresponding differential equation is (k is the constant of proportionality)

(1) $\frac{dQ}{dt}=k$ (2) $\frac{dQ}{dt}=Q$ (3) $\frac{dQ}{dt}=-k$ **(4) $\frac{dQ}{dt}=kQ$**

27. The population P of a city increases at a rate proportional to the product of population and to the difference between 5,00,000 and the population. The corresponding differential equation is (k is the constant of proportionality)

(1) $\frac{dP}{dt}=P(50000-P)$ (2) $\frac{dP}{dt}=k(50000-P)$ **(3) $\frac{dP}{dt}=kP(500000-P)$** (4) $\frac{dP}{dt}=kP$

28. For a certain substance, the rate of change of vapor pressure P with respect to temperature T is proportional to the vapor pressure and inversely proportional to the square of the temperature. The corresponding differential equation is (k is the constant of proportionality)

(1) $\frac{dP}{dT}=\frac{P}{T^2}$ (2) $\frac{dP}{dT}=k\frac{P}{T}$ **(3) $\frac{dP}{dT}=k\frac{P}{T^2}$** (4) $\frac{dP}{dT}=kP$

29. A saving amount (x) pays 8% interest per year, compounded continuously. In addition, the income from another investment is credited to the amount continuously at the rate of 400 per year. Then $\frac{dx}{dt}=$

(1) $\frac{8}{100}x+400$ (2) $\frac{8}{100}x$ (3) $8x+400$ (4) $\frac{1}{100}x+400$

30. Assume that a spherical rain drop evaporates at a rate proportional to its surface area. The rate of change of the radius (r) of the rain drop $\frac{dr}{dt}=$

(k is the constant of proportionality and $k>0$).

(1) kr (2) k (3) $-k$ (4) $-kr$

CHAPTER – 11

1. A random variable X is a function from

(1) $S\to\mathbb{R}$ (2) $\mathbb{R}\to S$ (3) $S\to\mathbb{N}$ (4) $\mathbb{N}\to S$

2. $X:S\to\mathbb{R}$ is said to be discrete random variable if

(1) range of X is countable (2) range of X is uncountable

(3) range of X is $\mathbb{N}$ (4) range of X is $\mathbb{R}$

3. $P[X=x_k], k=1,2,\cdots n$ is called a probability mass function if

(1) $P[X=x_k]\geq 0$ and $\sum_k P[X=x_k]=1$ (2) $P[X=x_k]>0$ and $\sum_k P[X=x_k]=1$

(3) $P[X=x_k]=0$ and $\sum_k P[X=x_k]=1$ (4) $P[X=x_k]\geq 0$ and $\sum_k P[X=x_k]=0$

4. Let X be a discrete random variable and taking the values $x_1,x_2\cdots x_n$ with $p.m.f$ $P[X=x_k]$. The cumulative distribution function $F(x)$ is defined as

(1) $P[X\leq x]$ (2) $1-P[X\leq x]$ (3) $P[X<x]$ (4) $1-P[X<x]$

5. Which of the following are true in the case of $c.d.f$ $F(x)$? (X is a discrete random variable)

(i) $0\leq F(x)\leq 1$ (ii) $\lim_{x\to-\infty}F(x)=0$ and $\lim_{x\to\infty}F(x)=1$

(iii) $P[x_1<X\leq k_2]=F(x_2)-F(x_1)$ (iv) $P[X>x]=1-P[X\leq x]=1-F(x)$

(1) (i) and (iv) only (2) (ii),(iii),(iv) only

(3) (i), (ii), (iii) only (4) all

6. Let X be a continuous random variable. The function $f(x)$ is said to be a $p.d.f$ if

(1) $f(x)>0$ and $\int_a^b f(x)dx=0$ (2) $f(x)\geq 0$ and $\int_a^b f(x)dx=1$

(3) $f(x)>0$ and $\int_a^b f(x)dx=1$ (4) $f(x)\geq 0$ and $\int_a^b f(x)dx=0$

7. For a continuous random variable, which of the following is/are incorrect?

(i) $P[X=x]=0$ and $P[a<X<b]=F(b)-F(a)$

(ii) $P[X=x]=1$ and $P[a<X<b]=F(b)-F(a)$

(iii) $P[X=x]=0$ and $P[a\leq X\leq b]=P[a<X<b]$

(iv) $P[a<X<b]=P[a\leq X<b]=P[a<X\leq b]$ and $P[X=x]=0$

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

8. With usual notations, which of the following are correct?

(i) $Var(X) = E(X^2) - [E(X)]^2$

(ii) $Var(aX + b) = a^2 Var(X)$

(iii) $E(aX + b) = aE(X) + b$

(iv) $E(X) = \int_{-\infty}^{\infty} f(x)dx$ if X is continuous

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

9. If X is a Bernoulli's random variable which follows Bernoulli's distribution with parameter p, then

(1) $\mu = p, \sigma = pq$ (2) $\mu = pq, \sigma = p$ (3) $\mu = pq, \sigma = q$ (4) $\mu = p, \sigma^2 = pq$

10. If $X \sim B(n, p)$ then

(1) $\mu = np, \sigma^2 = np(1-p)$ (2) $\mu = nq, \sigma = np(1-p)$

(3) $\mu = np, \sigma = np(1-p)$ (4) $\mu = npq \ \ \sigma = npq$

CHAPTER 12

1. Which of the following is not a binary operation on $\mathbb{R}$?

(1) + (2) − (3) ÷ (4) ×

2. The operation '−' is binary on

(1) $\mathbb{N}$ (2) $Q \setminus \{0\}$ (3) $\mathbb{R} \setminus \{0\}$ (4) Q

3. The operation '÷' is binary on

(1) $\mathbb{R} \setminus \{0\}$ (2) $\mathbb{C}$ (3) $\mathbb{R}$ (4) $\mathbb{Z}$

4. The additive inverse do not exists for some elements in the set

(1) $\mathbb{R}$ (2) $-1 \le x \le 2$ (3) $\mathbb{Z}$ (4) Q

5. The multiplicative inverse exists for each element in the set

(1) $-2 \le x \le 2$ (2) $\mathbb{Z}$ (3) $\mathbb{R} \setminus \{0\}$ (4) $\mathbb{C}$

6. The identity element under addition exists in

(1) $\mathbb{N}$ (2) $\mathbb{C} \setminus \{0\}$ (3) $(0 \ \ \infty)$ (4) $-3 \le x \le 3$

7. The properties closure, associative, identity, inverse and commutative under addition satisfy in the set

(1) $\mathbb{R}$ (2) $\mathbb{N}$ (3) $\{1, -1, 0\}$ (4) $Q \setminus \{0\}$

8. The fourth roots of unity under multiplication satisfies the properties

(1) closure only (2) closure and associative only

(3) closure, associative and identity (4) closure, associative identity and inverse

9. Which one of the following is correct?

(1) $[3]+_4[2]=[5]$

(2) $[0]+_{10}[12]=[0]$

(3) $[4]\times_5[3]=[12]$

(4) $[5]\times_6[4]=[2]$

10. Which of the following is not true?

(1) A Boolean matrix is a real matrix whose entries are either 0 or 1

(2) The product $\begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}\begin{bmatrix}0 & 1\\1 & 0\end{bmatrix}$ is a Boolean matrix

(3) All identity matrices I_n are Boolean matrices

(4) $\begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}\vee\begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}=\begin{bmatrix}2 & 0\\0 & 2\end{bmatrix}$

Chapter – 1

Qn.No.	1	2	3	4	5	6	7	8	9	10
Key	(or 2) (4)	(1)	(2)	(1)	(4)	(3)	(4)	(1)	(2)	(4)

Chapter – 2

Qn.No.	1	2	3	4	5	6	7	8	9	10
Key	(1)	(2)	(1)	(3)	(1)	(4)	(3)	(1)	(3)	(1)

Chapter – 3

Qn.No.	1	2	3	4	5	6				
Key	(1)	(3)	(4)	(3)	(1)	(1				

Chapter – 4

Qn.No.	1	2	3	4	5	6	7	8	9	10
Key	(3)	(2)	(3)	(1)	(1)	(2)	(1) (3)	(3)	(1)	(1)

Chapter – 5

Qn.No.	1	2	3	4	5	6	7	8	9	10
Key	(1)	(3)	(1)	(1)	(4)	(3)	(2)	(4)	(1)	(1)
Qn.No.	11	12	13							
Key	(1)	(1)	(3)							

Chapter – 6

Qn.No.	1	2	3	4	5	6	7	8	9	10
Key	(4)	(2) and (3)	(2)	(4)	(4)	(1)	(1)	(2)	(4)	(3) (4)
Qn.No.	11	12	13	14						
Key	(1)	(4)	(1)	(1)						

Chapter – 7

Qn.No.	1	2	3	4	5	6	7	8	9	10
Key	(4)	(2)	(1)	(3)	(4)	(4)	(3)	(4)	(1)	(1)
Qn.No.	11	12	13	14	15	16	17	18	19	20
Key	(1)	(4)	(1)	(1)	(4)	(4)	(2)	(1)	(3)	(1)
Qn.No.	21	22	23	24	25	26	27			
Key	(2)	(2)	(1)	(1)	(1)	(1)	(2)			

Chapter – 8

Qn.No.	1	2	3	4	5	6	7			
Key	(4)	(1)	(1)	(1)	(1)	(3)	(1)			

Chapter – 9

Qn.No.	1	2	3	4	5	6	7	8	9	10
Key	(1)	(2)	(2) (4)	(4)	(1)	(3)	(2)	(3)	(1)	(1)
Qn.No.	11									
Key	(3)									

Chapter – 10

Qn.No.	1	2	3	4	5	6	7	8	9	10
Key	(1)	(1)	(1)	(4)	(1)	(4)	(4)	(1)	(3)	(3)
Qn.No.	11	12	13	14	15	16	17	18	19	20
Key	(4)	(2)	(1)	(2)	(1)	(1) (2)	(4)	(1)	(3)	(1)
Qn.No.	21	22	23	24	25	26	27	28	29	30
Key	(2)	(1)	(3)	(4)	(1)	(4)	(3)	(3)	(1)	(3)

Chapter – 11

Qn.No.	1	2	3	4	5	6	7	8	9	10
Key	(1)	(1)	(1)	(1)	(4)	(2)	(2)	(2)	(4)	(1)

Chapter – 12

Qn.No.	1	2	3	4	5	6	7	8	9	10
Key	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(4)	(4)	(4)