MATHS WORK BOOK 23 – 24

Chapter – 1 RELATION AND FUNCTION

BRIKS ACADEMY **PADMANABHANAGAR** **CONT: 9900084667**

MCQ'S – 2; ; 3 Marks –1; 5 Marks – 1;

PART – A (MCQ …….Q.No. 1 and 2)

1. Let R be a relation on the set N of natural numbers defined by nRm if n divides m, then R is
   (a) Reflexive and symmetric (b) Transitive and symmetric
   (c) Equivalence (d) Reflexive, transitive but not symmetric

2. Let L denote the set of all straight lines in a plane. Let a relation R be defined by lRm if and only if l is perpendicular to m $\forall l, m \in L$. Then R is
   (a) reflexive (b) symmetric (c) transitive (d) none of these

3. Let T be the set of all triangles in the Euclidean plane, and let a relation R on T be defined as aRb if a is congruent to b , $\forall a, b \in T$. Then R is
   (a) Reflexive but not transitive (b) Transitive but not symmetric
   (c) Equivalence (d) None of these

4. Consider the non-empty set consisting of children in a family and a relation R defined as aRb if a is brother of b. Then R is
   (a) symmetric but not transitive (b) transitive but not symmetric
   (c) neither symmetric nor transitive (d) both symmetric and transitive

5. The maximum number of equivalence relations on the set $A = \{1, 2, 3\}$ are
   (a) 1 (b) 2 (c) 3 (d) 5

6. If a relation R on the set $\{1, 2, 3\}$ be defined by $R = \{(1, 2)\}$, then R is
   (a) reflexive (b) transitive (c) symmetric (d) none of these

7. Let us define a relation R in R as aRb if $a \geq b$. Then R is
   (a) an equivalence relation
   (b) reflexive, transitive but not symmetric
   (c) symmetric, transitive but not reflexive
   (d) neither transitive nor reflexive but symmetric

8. Let $A = \{1, 2, 3\}$ and consider the relation $R = \{(1,1), (2, 2)(3, 3), (1, 2), (2, 3), (1, 3)\}$. Then R is
   (a) reflexive but not symmetric (b) reflexive but not transitive
   (c) symmetric and transitive (d) neither symmetric, nor transitive

9. Let R be the relation the set $A=\{1,2,3,4\}$ given by $R=\{(1,2),(2,2),(1,1),(4,4),(1,3),(3,3),(3,2)\}$. Then,
   (a) R is reflexive and symmetric but not transitive
   (b) R is reflexive and transitive but not symmetric
   (c) R is symmetric and transitive but not reflexive
   (d) R is an equivalence relation

10. The smallest equivalence relation on $A=\{1,2,3\}$ is
   (a) $\{(1,1),(2,2),(3,3),(13),(3,1)\}$ (b) $\{(1,1),(2,2),(3,3),(1,2),(2,1)\}$
   (c) $\{(1,1),(2,2),(3,3)\}$ (d) $\{(1,1),(2,2),(3,3),(2,3),(3,2)\}$

11. Let N be the set of natural numbers and the function $f:N\to N$ be defined by $f(n)=2n+3$, $\forall n\in N$. Then f is
   (a) surjective (b) injective (c) bijective (d) none of these

12. Let $:R\to R$ be defined by $f(x)=x^2+1$. Then, pre-images of 17 and -3, respectively, are
   (a) $\phi,\{4,-4\}$ (b) $\{3,-3\},\phi$ (c) $\{4,-4\},\phi$ (d) $\{4,-4\},\{2,-2\}$

13. Let $f:R\to R$ be defined by $f(x)=\dfrac{1}{x}$, $\forall x\in R$. Then f is
   (a) one – one (b) onto (c) bijective (d) f is not defined

14. Let $f:R\to R$ be defined as $f(x)=x^4$. Choose the correct answer.
   (a) f is one-one onto (b) f is many-one onto
   (c) f is one-one but not onto (d) f is neither one-one nor onto

15. Let $f:R\to R$ be defined as $f(x)=3x$. Choose the correct answer.
   (a) f is one-one onto (b) f is many-one onto
   (c) f is one-one but not onto (d) f is neither one-one nor onto

PART – C, (3 MARKS – 1.........Q.NO. 32)

1. Show that the relation R in the set Z of integers given by $R = \{(x, y): 2 \text{ divides } (x-y)\}$ is an equivalence relation.
2. Determine whether the relation R in the set $A=\{1, 2, 3, \ldots\ldots 13, 14\}$ defined as $R=\{(x, y): 3x-y=0\}$, is reflexive, symmetric and transitive.
3. Prove that the relation R in the set of integer Z defined by $R=\{(x, y) : x - y \text{ is an integer}\}$ is an equivalence relation.
4. Show that the relation R in the set of real numbers R defined as $R=\{(a, b): a\le b^2\}$ is neither reflexive nor symmetric nor transitive.
5. Show that the relation R in the set $S=\{x: x\in Z \text{ and } 0\le x\le 12\}$ given by $R=\{(a, b): |a-b| \text{ is multiple of } 4\}$. Is an equivalence relation?
6. Determine whether the relation R in the set $A=\{1, 2, 3, 4, 5, 6\}$ as $R=\{(x, y): y \text{ is divisible by } x\}$ is reflexive, symmetric and transitive.
7. If $f:R\to R$ defined by $f(x)=3+4x$, prove that f is one-one and onto.
8. Show that the relation R in the set $A=\{1, 2, 3, 4, 5\}$ given by $R=\{(a, b): |a-b| \text{ is even}\}$ is an equivalence relation.

9. Let T be the set of all triangles in a plane with R a relation in T given by $R=\{(T_1,\ T_2):T_1 \text{ is congruent to } T_2\}$. Show that R is an equivalence relation.
10. Let *'L'* be the set of all lines in XY plane and R be the relation in L defines as $R=\{(L_1,\ L_2):L_1 \text{ is parallel to } L_2\}$. Show that R is an equivalence relation.

(PART – D, 5 MARKERS – 1..........Q.No.43)

1. Verify whether the function, $f:N\to Y$ defined by $f(x)=4x+3,$ where $Y=\{y:y=4x+3,\ x\in N\}$ is invertible or not. Write the inverse of $f(x)$ if exist.

Chapter – 2 INVERSE TRIGONOMETRY

BRIKS ACADEMY **PADMANABHANAGAR** **CONT: 9900084667**

MCQ'S – 1; FB – 1; 2 Marks – 1; 3 Marks – 1

MCQ'S(..........Q.No. 3)

1. Which of the following corresponds to the principal value branch of $\cos^{-1}$
   (a) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ (b) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ (c) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right) - \{0\}$ (d) $[0, \pi]$
2. Which of the following corresponds to the principal value branch of $\cot^{-1}$
   (a) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ (b) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ (c) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right) - \{0\}$ (d) $(0, \pi)$
3. The principal value branch of $\sec^{-1}$ is
   (a) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right] - \{0\}$ (b) $[0, \pi] - \left\{\frac{\pi}{2}\right\}$ (c) $(0, \pi)$ (d) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$
4. Which of the following corresponds to the principal value branch of $\sin^{-1}$
   (a) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ (b) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ (c) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right) - \{0\}$ (d) $(0, \pi)$
5. Which of the following is the principal value branch of $\operatorname{cosec}^{-1}x$?
   (a) $\left(\frac{-\pi}{2}, \frac{\pi}{2}\right)$ (b) $[0, \pi] - \left\{\frac{\pi}{2}\right\}$ (c) $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$ (d) $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right] - \{0\}$
6. One branch of $\cos^{-1}x$ other than the principal value branch corresponds to
   (a) $\left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$ (b) $[\pi, 2\pi] - \left\{\frac{3\pi}{2}\right\}$ (c) $(0, \pi)$ (d) $[2\pi, 3\pi]$
7. If $\cos\left(\sin^{-1}\frac{2}{5} + \cos^{-1} x\right) = 0$, then x is equal to
   (a) $\frac{1}{5}$ (b) $\frac{2}{5}$ (c) 0 (d) 1

8. If $\sin^{-1} x = y$, then
   (a) $0 \le y \le \pi$ (b) $-\frac{\pi}{2} \le y \le \frac{\pi}{2}$ (c) $0 < y < \pi$ (d) $\frac{\pi}{2} \le y \le -\frac{\pi}{2}$

9. $\tan^{-1}\sqrt{3} - \sec^{-1} -2$ is equal to
   (a) π (b) -π/3 (c) π/3 (d) 2π/3

10. $\cos^{-1}\cos\left(\frac{7\pi}{6}\right)$ is equal to
   (a) $\frac{7\pi}{6}$ (b) $\frac{5\pi}{6}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{6}$

11. $\sin(\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)$ is equal to
   (a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$ (d) 1

12. $\tan^{-1}\sqrt{3} - \cot^{-1} -\sqrt{3}$ is equal to
   (a) π (b) $-\frac{\pi}{2}$ (c) 0 (d) $2\sqrt{3}$

13. $\sin(\sin^{-1} x)$, $|x| < 1$ is equal to
   (a) $\frac{x}{\sqrt{1-x^2}}$ (b) $\frac{1}{\sqrt{1-x^2}}$ (c) $\frac{1}{\sqrt{1+x^2}}$ (d) $\frac{x}{\sqrt{1+x^2}}$

14. $\sin^{-1}(1-x) - 2\sin^{-1}x = \frac{\pi}{2}$ then x is equal to

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

PART – B (FB - 1)

8. $2\sin^{-1}\frac{3}{5} = \tan^{-1}A$ the A is equal to ....

9. $\cos\left(\sin^{-1}\frac{2}{5} + \cos^{-1}x\right) = 0$, then x is equal to.........

10. $\sin^{-1}\frac{8}{7} + \sin^{-1}\frac{3}{5} = \tan^{-1}x$ then x is equal to ....

11. $\sin\left(\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right)$ is equal to ....

PART – B (2 - MARKERS -1..........Q. NO. 21)

1. Prove that $2\sin^{-1}\frac{3}{5} = \tan^{-1}\frac{24}{7}$.

2. Prove that $\tan^{-1}\frac{2}{11} + \tan^{-1}\frac{7}{24} = \tan^{-1}\frac{1}{2}$.

3. Find the value $\tan^{-1}\left[2\cos\left(2\sin^{-1}\frac{1}{2}\right)\right]$.

4. Find the value of $\sin^{-1}\left(\sin\frac{3\pi}{5}\right)$.

5. Write the simplest form of $\tan^{-1}\left(\sqrt{\frac{1-\cos x}{1+\cos x}}\right), 0 < x < \pi$.

6. Prove that $3\sin^{-1}x = \sin^{-1}\left(3x - 4x^3\right), x \in \left[\frac{-1}{2}, \frac{1}{2}\right]$.

7. Prove that $3\cos^{-1}x = \cos^{-1}\left(4x^3 - 3x\right), x \in \left[\frac{1}{2}, 1\right]$.

PART – C (3 MARKERS – 1..........Q.NO. 33)

1. Write the simplest form of $\tan^{-1}\left(\frac{\cos x}{1-\sin x}\right), \frac{-3\pi}{2} < x < \frac{\pi}{2}$.

2. Find the value of $\tan\frac{1}{2}\left[\sin^{-1}\frac{2x}{1+x^2} + \cos^{-1}\frac{1-y^2}{1+y^2}\right], |x| < 1, y > 0 \,\&\, xy < 1$.

3. Express $\tan^{-1}\left(\frac{\cos x}{1-\sin x}\right), \frac{-3\pi}{2} < x < \frac{\pi}{2}$ in the simplest form.

4. Write the function $\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right), x \neq 0,$ in the simplest form.

5. Write the simplest form of $\tan^{-1}\left(\dfrac{\cos x - \sin x}{\cos x + \sin x}\right),\ 0 < x < \pi$.

6. Prove that $2\sin^{-1} x = \sin^{-1}\left(2x\sqrt{1-x^2}\right), \dfrac{-1}{\sqrt{2}} \le x \le \dfrac{1}{\sqrt{2}}$.

7. Write the simplest form of $\tan^{-1}\left(\dfrac{3a^2x - x^3}{a^3 - 3ax^2}\right), a > 0, \dfrac{-a}{\sqrt{3}} < x < \dfrac{a}{\sqrt{3}}$.

Chapter – 3 MATRICES

BRIKS ACADEMY PADMANABHANAGAR CONT: 9900084667

MCQ'S –1; 3 Marks – 1; 5 Marks – 1

PART – A (MCQ – 1………Q. No. 4)

1. Which of the given values of x and y make the following pair of matrices equal

$$\begin{bmatrix} 3x+7 & 5 \\ y+1 & 2-3x \end{bmatrix}, \begin{bmatrix} 0 & y-2 \\ 8 & 4 \end{bmatrix}$$

(a) $x=-\frac{1}{3}, y=7$ (b) $x=-\frac{2}{3}, y=7$ (c) $x=-\frac{1}{3}, y=-\frac{2}{3}$ (d) not possible to find

2. The number of all possible matrices of order 3×3 with each entry 0 or 1 is:
(a) 27 (b) 18 (c) 81 (d) 512

3. Assume X, Y, Z, W and P are matrices of order $2\times n, 3\times k, 2\times p, n\times 3$ and $p\times k$, respectively. The restriction on n, k and p so that PY+WY will be defined are:
(a) $k=3, p=n$ (b) k is arbitrary, p=2
(c) p is arbitrary, k=3 (d) k=2, p=3

4. Assume X, Y, Z, W and P are matrices of order $2\times n, 3\times k, 2\times p, n\times 3$ and $p\times k$, respectively. If n=p, then the order of the matrix *7X-5Z* is:
(a) $p\times2$ (b) $2\times n$ (c) $n\times3$ (d) $p\times n$

5. If $A=\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$, then $A+A'=I$, if the value of α is

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

6. Matrices A and B will be inverse of each other only if
(a) AB = BA (b) AB = BA = 0 (c) AB = 0, BA = I (d) AB = BA = I.

7. If $A=\begin{bmatrix} \alpha & \beta \\ \gamma & -\alpha \end{bmatrix}$ is such that A² = I, then

(a) $1+\alpha^2+\beta\gamma=0$ (b) $1-\alpha^2+\beta\gamma=0$ (c) $1-\alpha^2-\beta\gamma=0$ (d) $1+\alpha^2-\beta\gamma=0$.

8. If the matrix A is both symmetric and skew symmetric, then
(a) A is diagonal matrix (b) A is a zero matrix
(c) A is a square matrix (d) None of these

9. If $\begin{bmatrix} 2x+y & 4x \\ 5x-7 & 4x \end{bmatrix}=\begin{bmatrix} 7 & 7y-13 \\ y & x+6 \end{bmatrix}$, then the value of x and y is
(a) $x=3, y=1$ (b) $x=2, y=3$ (c) $x=2, y=4$ (d) $x=3, y=3$

10. If A and B are two matrices of the order $3\times m$ and $3\times n$, respectively, and $m=n$, then the order of matrix $(5A-2B)$ is

(a) $m\times 3$ (b) 3×3 (c) $m\times n$ (d) $3\times n$

11. If P and Q are symmetric matrices of same order, then $PQ-QP$ is

(a) Skew symmetric matrix (b) Symmetric matrix
(c) Zero matrix (d) Identity matrix.

12. If $A=\begin{bmatrix}\cos\alpha & \sin\alpha\\ -\sin\alpha & \cos\alpha\end{bmatrix}$, then $AA'=$

(a) A (b) Zero matrix (c) A' (d) I

13. If the matrix A is both symmetric and skew symmetric, then

(a) A is diagonal matrix (b) A is a zero matrix
(c) A is a square matrix (d) None of these

14. If $2\begin{bmatrix}1 & 3\\ 0 & x\end{bmatrix}+\begin{bmatrix}y & 0\\ 1 & 2\end{bmatrix}=\begin{bmatrix}5 & 6\\ 1 & 8\end{bmatrix}$, then the values of x and y are

(a) $x=3,\ y=3$ (b) $x=-3,\ y=3$ (c) $x=3,\ y=-3$ (d) $x=-3,\ y=-3$

15. If $A=\begin{bmatrix}\cos 2\theta & -\sin 2\theta\\ \sin 2\theta & \cos 2\theta\end{bmatrix}$ and $A+A^T=I$, then where I is the unit matrix of 2×2 and A^T is the transpose of A, then the value of θ is equal to

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

16. If A and B are symmetric matrices of the same order, then which one of the following is NOT true?

(a) $A+B$ is symmetric (b) $A-B$ is symmetric
(c) $AB+BA$ is symmetric (d) $AB-BA$ is symmetric

17. If A is square matrix such that A2 = A, then $(I + A)^3 - 7A$ is equal to

(a) A (b) I – A (c) I (d) 3A

PART – C (THREE MARKS QUESTIONS- 1..........Q.NO. 34)

1. Express the matrix $\begin{bmatrix}2 & -2 & -4\\ -1 & 3 & 4\\ 1 & -2 & -3\end{bmatrix}$ as the sum of a symmetric and a skew symmetric matrix.

2. Express the matrix $\begin{bmatrix}6 & -2 & 2\\ -2 & 3 & -1\\ 2 & -1 & 3\end{bmatrix}$ as the sum of a symmetric and a skew symmetric matrix.

3. Express the matrix $\begin{bmatrix}1 & 5\\ -1 & 2\end{bmatrix}$ as the sum of a symmetric and a skew symmetric matrix.

4. If $F(x)=\begin{bmatrix}\cos x & -\sin x & 0\\ \sin x & \cos x & 0\\ 0 & 0 & 1\end{bmatrix}$, show that $F(x)\cdot F(y)=F(x+y)$.

5. If $A=\begin{bmatrix}3 & -2\\ 4 & -2\end{bmatrix}$ and $I=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$, find k so that $A^2=kA-2I$.

6. Express the matrix $\begin{bmatrix}3 & 5\\ 1 & -1\end{bmatrix}$ as the sum of a symmetric and a skew symmetric matrix.

PART – D, (FIVE MARK QUESTIONS-1........Q.NO.44)

1. If $A=\begin{bmatrix}1 & -1\\ 2 & 3\end{bmatrix}$, $B=\begin{bmatrix}1 & 3\\ -1 & 4\end{bmatrix}$ and $C=\begin{bmatrix}2 & -2\\ 3 & 0\end{bmatrix}$ verify that $A(BC)=(AB)C$.

2. If $A'=\begin{bmatrix}1 & 5\\ 2 & 0\\ -3 & 2\end{bmatrix}$, $B=\begin{bmatrix}3 & -1 & 2\\ 4 & 2 & 5\end{bmatrix}$ and $C=\begin{bmatrix}4 & 1 & 2\\ 0 & 3 & 2\end{bmatrix}$ find $A+B$ and $B-C$. Show that $A+(B-C)=(A+B)-C$.

3. If $A=\begin{bmatrix}-1 & 2\\ 2 & 3\end{bmatrix}$, $B=\begin{bmatrix}1 & -3\\ -3 & 4\end{bmatrix}$. Verify that $AB-BA$ is a skew-symmetric matrix and $AB+BA$ is a symmetric matrix.

4. If $A=\begin{bmatrix}1 & 2\\ 2 & 1\end{bmatrix}$, $B=\begin{bmatrix}2 & 0\\ 1 & 3\end{bmatrix}$ and $C=\begin{bmatrix}1 & 1\\ 2 & 3\end{bmatrix}$. Calculate AB, AC and $A(B+C)$. Verify that $\mathrm{AB}+\mathrm{AC}=\mathrm{A}(\mathrm{B}+\mathrm{C})$.

5. If $A=\begin{bmatrix}0 & 6 & 7\\ -6 & 0 & 8\\ 7 & -8 & 0\end{bmatrix}$, $\mathrm{B}=\begin{bmatrix}0 & 1 & 1\\ 1 & 0 & 2\\ 1 & 2 & 0\end{bmatrix}$ and $C=\begin{bmatrix}2\\ -2\\ 3\end{bmatrix}$. Calculate AC, BC and $(A+B)C$. Also, verify that $AC+BC=(A+B)C$.

6. If $A=\begin{bmatrix}-2\\ 4\\ 5\end{bmatrix}$, $B=\begin{bmatrix}1 & 3 & -6\end{bmatrix}$, verify that $(AB)'=B'\cdot A'$.

7. If $A=\begin{bmatrix}1 & 1 & -1\\ 2 & 0 & 3\\ 3 & -1 & 2\end{bmatrix}$, $B=\begin{bmatrix}1 & 3\\ 0 & 2\\ -1 & 4\end{bmatrix}$ and $C=\begin{bmatrix}1 & 2 & 3 & 4\\ 2 & 0 & -2 & 1\end{bmatrix}$, find $A(BC)$, $(AB)C$ and show that $(AB)C=A(BC)$.

8. If $A=\begin{bmatrix}1 & 2 & 3\\ 3 & -2 & 1\\ 4 & 2 & 1\end{bmatrix}$, then show that $A^3-23A-40I=0$.

9. If $A=\begin{bmatrix}1 & 2 & -3\\ 5 & 0 & 2\\ 1 & -1 & 1\end{bmatrix}$, $B=\begin{bmatrix}3 & -1 & 2\\ 4 & 2 & 5\\ 2 & 0 & 3\end{bmatrix}$ and $C=\begin{bmatrix}4 & 1 & 2\\ 0 & 3 & 2\\ 1 & -2 & 3\end{bmatrix}$, then compute $(A+B)$ and $(B-C)$. Also, verify that $A+(B-C)=(A+B)-C$.

10. For the matrices $A=\begin{bmatrix}1\\ -4\\ 3\end{bmatrix}$, $B=\begin{bmatrix}-1 & 2 & 1\end{bmatrix}$, verify that $(AB)'=B'\cdot A'$.

11. For the matrices $A=\begin{bmatrix}0\\1\\2\end{bmatrix}$, $B=\begin{bmatrix}1 & 5 & 7\end{bmatrix}$, verify that $(AB)'=B'\cdot A'$.

Chapter – 4 DETERMINUNT

BRIKS ACADEMY PADMANABHANAGAR CONT: 9900084667

MCQ'S –12; FB – 1; 2 Marks – 1; 5 Marks – 1

PART – A (MCQ-1..........Q.No. 5)

1. If $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$ then x is equal to
   (a) 6 (b) ± 6 (c) -6 (d) 0
2. Let A be a square matrix of order 3×3, then $|kA|$ is equal to
   (a) $k|A|$ (b) $k^2|A|$ (c) $k^3|A|$ (d) $3k|A|$
3. Which of the following is correct
   (a) Determinant is a square matrix
   (b) Determinant is a number associated to a matrix
   (c) Determinant is a number associated to a square matrix
   (d) None of these
4. If $\Delta = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$ and A_{ij} is cofactor of a_{ij}, then value of Δ is given by
   (a) $a_{11}A_{31} + a_{12}A_{32} + a_{13}A_{33}$ (b) $a_{11}A_{11} + a_{12}A_{21} + a_{13}A_{31}$
   (c) $a_{21}A_{11} + a_{22}A_{12} + a_{23}A_{13}$ (d) $a_{11}A_{11} + a_{21}A_{21} + a_{31}A_{31}$
5. Let A be a non-singular square matrix of order 3×3. Then $|adjA|$ is equal to
   (a) $|A|$ (b) $|A|^2$ (c) $|A|^3$ (d) $3|A|$
6. If A is an invertible matrix of order 2, then $\det(A^{-1})$ is equal to
   (a) $\det(A)$ (b) $\dfrac{1}{\det(A)}$ (c) *1* (d) 0
7. If $A = \begin{bmatrix} 2 & \lambda & -3 \\ 0 & 2 & 5 \\ 1 & 1 & 3 \end{bmatrix}$, then A^{-1} exist if
   (a) $\lambda = 2$ (b) $\lambda \neq 2$ (c) $\lambda \neq -2$ (d) None of these
8. If A = $[a_{ij}]$ is a scalar matrix of order n x n such that a_{ii} = k for all i, then $|A|$ =
   (a) nk (b) n + k (c) n^k (d) k^n
9. If A is a square matrix of order n, then det (adj A) =
   (a) $(\det A)^{n-1}$ (b) $(\det A)^{n-2}$ (c) $(\det A)^n$ (d) None of these

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

(a) $\begin{bmatrix}5 & 0 & 0\\ 0 & 5 & 0\\ 0 & 0 & 5\end{bmatrix}$ (b) $\begin{bmatrix}5 & 1 & 1\\ 1 & 5 & 1\\ 1 & 1 & 5\end{bmatrix}$ (c) $\begin{bmatrix}0 & 0 & 0\\ 0 & 0 & 0\\ 0 & 0 & 0\end{bmatrix}$ (d) $\begin{bmatrix}8 & 0 & 0\\ 0 & 8 & 0\\ 0 & 0 & 8\end{bmatrix}$

11. If A is any square matrix of order 3 x 3 then |3A| is equal to
 (a) 9|A| (b) 27|A| (c) $\frac{1}{3}|A|$ (d) 3|A|

12. Let A be a square matrix of order 3 X 3, then |5A|=
 (a) 5 |A| (b) 125 |A| (c) 25 |A| (d) 15 |A|

13. If A is a square matrix of order 3 and |A|= 5, then |A.adjA|is
 (a) 625 (b) 5 (c) 125 (d) 25

14. If A and B are matrices of order 33 and |A|=5,|B|=3|,|=5,|B|=3 then |3AB| is
 (a) 425 (b) 405 (c) 565 (d) 585

15. If A is a matrix of order 3×3, then $(A^2)^{-1}$ is equal to
 (a) $(-A^2)^2$ (b) A^2 (c) $(A^{-1})^2$ (d) $(-A)^{-2}$

PART – B (FB...........Q.No. 17)

1. If $\begin{vmatrix}x & 2\\ 18 & x\end{vmatrix}=\begin{vmatrix}6 & 2\\ 18 & 6\end{vmatrix}$, then x is equal to ....
2. If area of triangle is 35 sq. units with vertices $(2,-6),(5,4)$ and $(k,4)$. Then k is................
3. The minors of 1in the matrix $\begin{bmatrix}1 & 4 & 2\\ 2 & -1 & 4\\ -3 & 7 & 6\end{bmatrix}$ is ....
4. The co-factors of 7 in the matrix $\begin{bmatrix}1 & -2 & 3\\ 4 & -1 & 7\\ 2 & 4 & 6\end{bmatrix}$ is. ....
5. If A is a matrix of order 3, such that A (adj A) = 10I, then |adj A| = ...
6. The value of the determinant of a skew symmetric matrix of order three is..............

PART – B (2 markers – 1..........Q.No.22)

1. If the area of a triangle with vertices $(-2,0),(0,4)$ and $(0,k)$ is 4 square units, find the values of k using determinants.
2. Find the equation of a line passing through $(3,1)$ and $(9,3)$ using determinants.
3. Find the area of a triangle whose vertices are $(1,3),(2,5)$ and $(7,5)$ using determinant.

4. Show that the points $A(a, b+c)$, $B(b, c+a)$, $C(c, a+b)$ are collinear using determinants.

PART – D (FIVE MARKERS – 1........Q.NO. 45)

1. Solve the following system of equations by matrix method: $x+y+z=6$, $y+3z=11$ and $x-2y+z=0$.

2. Solve the following system of equations by matrix method: $3x-2y+3z=8$, $2x+y-z=1$ and $4x-3y+2z=4$.

3. Solve the following system of equations by matrix method: $2x-3y+5z=11$, $3x+2y-4z=-5$ and $x+y-2z=-3$.

4. Solve the following system of equations by matrix method: $x-y+z=4$, $2x+y-3z=0$ and $x+y+z=2$.

5. Solve the following system of equations by matrix method: $2x+3y+3z=5$, $x-2y+z=-4$ and $3x-y-2z=3$.

6. Solve the following system of equations by matrix method: $x-y+2z=7$, $3x+4y-5z=-5$ and $2x-y+3z=12$.

7. If $A=\begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$, find A^{-1}. Using A^{-1} solve the system of equations $2x-3y+5z=11$, $3x+2y-4z=-5$ and $x+y-2z=-3$.

8. Solve the following by using matrix method: $2x+y+z=1$, $x-2y-z=\frac{3}{2}$, $3y-5z=9$

9. Use the product $\begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix}\begin{bmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{bmatrix}$ to solve the system of equations $x-y+2z=1$, $2y-3z=1$, $3x-2y+4z=9$.

PART – E (4 marks – 1 ……….Q.No. 52)

1. If A = $\begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix}$ and A = $\begin{bmatrix} 6 & 8 \\ 7 & 9 \end{bmatrix}$ verify that $(AB)^{-1} = B^{-1}A^{-1}$
2. A = $\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ show that $A^2 - 5A + 7I = 0$. Hence find A^{-1}
3. A = $\begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$ show that $A^2 - 4A + I = 0$. Hence find A^{-1}

Chapter – 4 CONTINUITY

BRIKS ACADEMY **PADMANABHANAGAR** **CONT: 9900084667**

4 Marks – 1

PART – E : CONTINUITY (4 – Markers – 1........Q.No. 52)

1. Find the value of ***k***, if $f(x)=\begin{cases}\dfrac{k\cos x}{\pi-2x} & \text{if } x\neq\dfrac{\pi}{2}\\ 3 & \text{if } x=\dfrac{\pi}{2}\end{cases}$ is continuous at $x=\dfrac{\pi}{2}$.

2. Find the relationship between a and b so that the function f defined by $f(x)=\begin{cases}ax+1, & \text{if } x\le 3\\ bx+1, & \text{if } x>3\end{cases}$ is continuous at x =3.

3. Find the value of ***k***, if $f(x)=\begin{cases}kx+1, & \text{if } x\le 5\\ 3x-5, & \text{if } x>5\end{cases}$ is continuous at x = 5.

4. Find the value of ***k***, if $f(x)=\begin{cases}\dfrac{1-\cos 2x}{1-\cos x}, & x\neq 0\\ k, & x=0\end{cases}$ is continuous at $x=0$.

5. Find the value of ***k***, if $f(x)=\begin{cases}kx^2 & if \quad x\le 2\\ 3 & if \quad x>2\end{cases}$ is continuous at $x=2$.

6. Find the values of a and b such that the function defined by $f(x)=\begin{cases}5, & \text{if } x\le 2\\ ax+b, & \text{if } 2<x<10\\ 21, & \text{if } x\ge 10\end{cases}$ is a continuous function.

Chapter – 5 DIFFERENTIATION

BRIKS ACADEMY PADMANABHANAGAR CONT: 9900084667

MCQ'S –1; 2 Marks – 1; 3 Marks – 2; 5 – MARKS - 1

PART – A (MCQ – 2………Q.NO.7)

1. If $f(x) = \begin{cases} 2x+3, & if\ x \le 2 \\ 2x-3, & if\ \ x > 2 \end{cases}$ then the point of discontinuity is

   (a) x = 2 (b) for all value of x (c) no value of x (d) at all integer

2. If $f(x) = \begin{cases} x+5, & if\ x \le 1 \\ x-5, & if\ \ x > 1 \end{cases}$ then the function f(x) is

   (b) Continuous at x = 1 (b) discontinuous at x = 1

   (c) Discontinuous at x = 2 (d) is discontinuous at x = 3

3. If $f(x) = \begin{cases} ax+1, & if\ x \le 3 \\ bx+3, & if\ \ x > 3 \end{cases}$ is continuous at x = 3 the relation between a and b is

   (a) 3a = 3b +2 (b) 3b = 3a + 2 (c) a = b (d) a – b = 2

4. The function $f(x) = |x-1|, x \in R\ is$

   (a) Continuous and differentiable at x = 1

   (b) Continuous but differentiable at x = 1

   (c) Differentiable but not continuous at x = 1

   (d) not Continuous and not differentiable at x = 1

5. The greatest integer function defined by f(x) = [x], $0 < x < 3$. Then f(x) is not differentiable
   (a) Only at x = 2 (b) only at x = 1 (c) both at x = 1 and x = 2 (d) for all value of x $\in Z$.

6. If $y = 2^{\log x}$, then $\frac{dy}{dx}$ is

   (a) $\frac{2^{\log x}}{\log 2}$ (b) $2^{\log x}.\log 2$ (c) $\frac{2^{\log x}}{x}$ (d) $\frac{2^{\log x}.\log 2}{x}$

7. If $\sin y = x\sin(a+y)$, then $\frac{dy}{dx}$ is equal to

   (a) $\frac{\sin\sqrt{a}}{\sin(a+y)}$ (b) $\frac{\sin^2(a+y)}{\sin a}$ (c) $\frac{\sin(a+y)}{\sin a}$ (d) $\frac{\cos(a+y)}{\cos a}$

8. If $\sin x = \frac{2t}{1+t^2}$ and $\tan y = \frac{2t}{1-t^2}$, then $\frac{dy}{dx}$ is equal to

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

9. If $x = a\cos^3\theta$ and $y = a\sin^3\theta$, then $\frac{dy}{dx}$ is

   (a) $\sqrt[3]{\frac{y}{x}}$ (b) $\sqrt[3]{\frac{x}{y}}$ (c) $-\sqrt[3]{\frac{x}{y}}$ (d) $-\sqrt[3]{\frac{y}{x}}$

10. If $x=a(\theta-\sin\theta)$ and $y=a(1-\cos\theta)$, then $\frac{dy}{dx}$ is equal to:

(a) $\cot\frac{\theta}{2}$ (b) $\tan\frac{\theta}{2}$ (c) $\frac{1}{2}\text{cosec}^2\frac{\theta}{2}$ (d) $-\frac{1}{2}\text{cosec}^2\frac{\theta}{2}$

11. If $x=a(\theta-\sin\theta)$ and $y=a(1-\cos\theta)$, then $\frac{dy}{dx}$ is equal to:

(a) $\cot\frac{\theta}{2}$ (b) $\tan\frac{\theta}{2}$ (c) $\frac{1}{2}\text{cosec}^2\frac{\theta}{2}$ (d) $-\frac{1}{2}\text{cosec}^2\frac{\theta}{2}$

12. If $x=2\cos t+\cos 2t$ and $y=2\sin t-\sin 2t$, then $\frac{dy}{dx}$ at $t=\frac{\pi}{4}$ is:

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

13. If $x=e^{\theta}(\sin\theta-\cos\theta)$ and $y=e^{\theta}(\sin\theta+\cos\theta)$, then $\frac{dy}{dx}$ at $\theta=\frac{\pi}{4}$ is

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

14. If $x=\frac{1-t^2}{1+t^2}$ and $y=\frac{2t}{1+t^2}$, then $\frac{dy}{dx}$ is equal to

(a) $-\frac{y}{x}$ (b) $\frac{y}{x}$ (c) $-\frac{x}{y}$ (d) $\frac{x}{y}$

15. The derivative of $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ w.r.t. $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ is:

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

16. If y = log_7^x $then \frac{dy}{dx}$ =

(a) $\frac{1}{x\log 7}$ (b) $\frac{1}{7\log x}$ (c) $\frac{\log x}{7}$ (d) $\frac{1}{7\log x}$

PART – B (2 marks – 2..........Q.No.23)

1. If $y+\sin y=\cos x$, find $\frac{dy}{dx}$.

2. If $y=x^x$, find $\frac{dy}{dx}$.

3. If $\sqrt{x}+\sqrt{y}=\sqrt{10}$, show that $\frac{dy}{dx}+\sqrt{\frac{y}{x}}=0$.

4. Find $\frac{dy}{dx}$, $x^2+xy+y^2=100$.

5. Find the derivative $\sqrt{x}+\sqrt{y}=\sqrt{9}$ $at\,(4,9)$

6. If $y=\tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right), \frac{-1}{\sqrt{3}}<x<\frac{1}{\sqrt{3}}$ then find $\frac{dy}{dx}$

7. Find $\frac{dy}{dx}$, if $\sin^2 x+\cos^2 y=k$, where k is constant.

8. Find $\frac{dy}{dx}$, *if* $2x+3y=\sin y$

9. If $y=\sec^{-1}\left(\frac{1}{2x^2-1}\right)$, $0<x<\frac{1}{\sqrt{2}}$,find $\frac{dy}{dx}$.

10. If $x=a\cos\theta$ & $y=a\sin\theta$, *then find* $\frac{dy}{dx}$.

11. If $y=\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, $0<x<1$, find $\frac{dy}{dx}$.

PART – C (3 marks – 2,..........Q.No. 35, 36)

1. Find $\frac{dy}{dx}$, if $x=a(\cos\theta+\theta.\sin\theta)$ *and* $y=a(\sin\theta-\theta\cos\theta)$

2. If $x=a(\theta+\sin\theta)$ *and* $y=a(1-\cos\theta)$, prove that $\frac{dy}{dx}=\tan\frac{\theta}{2}$.

3. If $x=\sqrt{a^{\sin^{-1}t}}$ *and* $y=\sqrt{a^{\cos^{-1}t}}$, then show that $\frac{dy}{dx}=\frac{-y}{x}$.

4. If $x=a\cos^3\theta$ and $y=a\sin^3\theta$, prove that $\frac{dy}{dx}=-\sqrt[3]{\frac{y}{x}}$.

5. If $y=\sin^{-1}\left(\frac{2^{x+1}}{1+4^x}\right)$, find $\frac{dy}{dx}$.

6. Differentiate $x^{\sin x}+(\sin x)^{\cos x}$ w.r.t x.

7. If $x=a(\cos t+\log\tan\frac{t}{2})$, $y=a\sin t$ find $\frac{dy}{dx}$.

8. If $x=a(\theta-\sin\theta)$ and $y=a(1+\cos\theta)$ then prove that $\frac{dy}{dx}=-\cot\left(\frac{\theta}{2}\right)$.

9. Differentiate x^{sinx} $w.r.t\ x$

10. Differentiate $\sin^2 x\ w.r.t.\ e^{cosx}$

11. If $x^y=a^x$, prove that $\frac{dy}{dx}=\frac{x\log_e^a-y}{x\log_e^x}$.

12. Differentiate $\left(x+\frac{1}{x}\right)^x$ with respect to x.

13. Find $\frac{dy}{dx}$, if $y=(\log x)^{\cos x}$.

14. If $y=x^x$, find $\frac{dy}{dx}$.

PART – D (5marks – 1..........Q.No.46)

1. If $y=3\cos(\log x)+4\sin(\log x)$, show that $x^2y_2+xy_1+y=0$.

2. If $y=Ae^{mx}+Be^{nx}$, prove that $\frac{d^2y}{dx^2}-(m+n)\frac{dy}{dx}+mny=0$.

3. If $y=(\tan^{-1}x)^2$ then show that $(x^2+1)^2\frac{d^2y}{dx^2}+2x(x^2+1)\frac{dy}{dx}=2$.

4. If $y=A\cdot\sin x+B\cdot\cos x$, then prove that $\frac{d^2y}{dx^2}+y=0$.

5. If $y=3e^{2x}+2\cdot e^{3x}$, prove that $\frac{d^2y}{dx^2}-5\frac{dy}{dx}+6y=0$.

6. If $y=\sin^{-1}x$, show that $(1-x^2)\cdot\frac{d^2y}{dx^2}-x\cdot\frac{dy}{dx}=0$.

7. If $y=(\sin^{-1}x)^2$, show that $(1-x^2)\frac{d^2y}{dx^2}-x\frac{dy}{dx}=2$.

8. If $y=5\cdot\cos x-3\sin x$, prove that $\frac{d^2y}{dx^2}+y=0$.

9. If $y=500e^{7x}+600e^{-7x}$, show that $\frac{d^2y}{dx^2}=49y$.

Chapter – 6 APLICATION OF DIFF.

BRIKS ACADEMY **PADMANABHANAGAR** **CONT: 9900084667**

MCQ'S –1; 2 Marks – 2; 3 Marks – 1

PART – A (MCQ – 1........Q.No.8)

1. The point of inflation of the function $y = x^3$ is

(a) (2, 8) (b) (1, 1) (c) (0, 0) (d) (-3, -27)

2. The rate of change of the area of a circle with respect to its radius r at $r = 6$ cm is

(a) 10π (b) 12π (c) 8π (d) 11π

3. The total revenue in Rupees received from the sale of x units of a product is given by $R(x) = 3x^2 + 36x + 5$. The marginal revenue, when $x = 15$ is

(a) 116 (b) 96 (c) 90 (d) 126

4. A ladder, 5 meters long, standing on a horizontal floor, leans against a vertical wall, if the top of the ladder slides down at the rate of 10cm/sec, then the rate at which the angle between the floor and the ladder is decreasing when lower end of ladder id 2 meters from the wall is:

(a) $\frac{1}{10}$ radians/sec (b) $\frac{1}{20}$ radians/sec

(c) 20 radians/sec (d) 10 radians/sec

5. A balloon which always remains spherical is being inflated by pumping in 10 cubic centimeters of gas per second. Find the rate at which the radius of the balloon is increasing when the radius is 15cms.

(a) $\frac{1}{90\pi}$ cm/sec (b) $\frac{1}{9\pi}$ cm/sec (c) $\frac{1}{30\pi}$ cm/sec (d) $\frac{1}{\pi}$ cm/sec

6. A stone is dropped into a quite lake and waves moves in circles at the speed of 5cm/sec. At the instant, when the radius of circular wave is 8cm , how fast is the enclosed area increasing?

(a) $8\pi cm^2/s$ (b) $80\pi cm^2/s$ (c) $6\pi cm^2/s$ (d) $\frac{8}{3}\pi cm^2/s$

7. Which of the following functions are strictly decreasing on $\left(0, \frac{\pi}{2}\right)$?

(a) $\cos x$ (b) $\cos 2x$ (c) $\cos 3x$ (d) $\tan x$

8. Which of the following functions is decreasing on $\left(0, \frac{\pi}{2}\right)$

(a) $\sin 2x$ (b) $\tan x$ (c) $\cos x$ (d) $\cos 3x$

9. The function $f(x) = x^2 + 2x - 5$ is strictly increasing in the interval

(a) $(-1, \infty)$ (b) $(-\infty, -1)$ (c) $[-1, \infty)$ (d) $(-\infty, -1]$

10. The local minimum value of the function f given by $f(x) = 3 + |x|$, $x \in R$ is

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

PART – B (2marks – 2……..Q.No. 24, 25)

1. Find the rate of change of area of a circle with respect to its radius r when $r = 3cm$.
2. Find the local maximum value of the function of the function $g(x) = x^3 - 3x$.
3. Find the maximum and minimum value of the function $f(x) = |\sin 4x + 3|$.
4. The total revenue in Rupees received from the sale of x units of a product is given by $R(x) = 13x^2 + 26x + 15$. Find the marginal revenue when $x = 7$.
5. Find the absolute maximum value and absolute minimum value of the function $f(x) = \sin x + \cos x,\ x \in [0, \pi]$.

PART – C (3 marks – 1………Q.No. 37)

1. Find the intervals in which the function f given by $f(x) = x^2 - 4x + 6$ is (i) strictly increasing (ii) strictly decreasing.
2. Find the intervals in which the function f given by $f(x) = 2x^3 - 3x^2 - 36x + 7$ is

   (i) strictly increasing (ii) strictly decreasing.
3. The total revenue in Rupees received from the sale of x units of a product is given by $R(x) = 13x^2 + 26x + 15$. Find the marginal revenue when $x = 7$.
4. A circular disk of radius 3cm is being heated. Due to expansion, its radius increases at the rate of 0.05cm/sec. find the rate at which its area increasing when the radius is 3.2cm.
5. Find two positive numbers whose sum is 15 and sum of whose squares is minimum.
6. Find two numbers whose sum is 24 and whose product is as large as possible.
7. Find the absolute maximum value and absolute minimum value of the function $f(x) = \sin x + \cos x,\ x \in [0, \pi]$.

Chapter – 7 INTEGRALS

BRIKS ACADEMY PADMANABHANAGAR CONT: 9900084667

MCQ'S – 2; 2 Marks – 1; 3 Marks – 1; 5 Marks – 1

MCQ'S : (2..........Q.No. 9, 10)

1. The anti derivative of $\left(\sqrt{x}+\frac{1}{\sqrt{x}}\right)$ equals

(a) $\frac{1}{3}x^{\frac{1}{3}}+2x^{\frac{1}{2}}+c$ (b) $\frac{2}{3}x^{\frac{2}{3}}+\frac{1}{2}x^2+c$ (c) $\frac{2}{3}x^{\frac{3}{2}}+2x^{\frac{1}{2}}+c$ (d) $\frac{3}{2}x^{\frac{3}{2}}+\frac{1}{2}x^{\frac{1}{2}}+c$

2. If $\frac{d}{dx}\left(f(x)\right)=4x^3-\frac{3}{x^4}$ such that f(2) = 0 then f(x) is

(a) $x^4+\frac{1}{x^3}-\frac{129}{8}$ (b) $x^3+\frac{1}{x^4}+\frac{129}{8}$ (c) $x^4+\frac{1}{x^3}+\frac{129}{8}$ (d) $x^3+\frac{1}{x^4}-\frac{129}{8}$

3. $\int\frac{e^x(1+x)}{\cos^2(e^x x)}dx$ is equal to

(a) $-\cot(ex^x)$+c (b) tan(xe^x)+c (c) tan(e^x) + c (d) cot(e^x) + c

4. $\int\frac{1}{x^2+2x+2}dx$ is equal to

(a) $x\tan^{-1}(x+1)+c$ (b) $\tan^{-1}(x+1)+c$

(c) $(x+1)\tan^{-1}(x)+c$ (d) $\tan^{-1}(x)+c$

5. $\int\frac{1}{\sqrt{9x-4x^2}}dx$ is equal to

(a) $\frac{1}{9}\sin^{-1}\frac{9x-8}{8}+c$ (b) $\frac{1}{2}\sin^{-1}\frac{9x-8}{9}+c$

(c) $\frac{1}{3}\sin^{-1}\frac{9x-8}{8}+c$ (a) $\frac{1}{2}\sin^{-1}\frac{9x-8}{9}+c$

6. $\int\frac{x}{(x-1)(x-2)}dx$ is equal to

(a) $\log\left|\frac{(x-1)^2}{x-2}\right|+c$ (b) $\log\left|\frac{(x-2)^2}{x-1}\right|+c$

(c) $\log\left|\left(\frac{x-1}{x-2}\right)^2\right|+c$ (d) $\log|(x-1)(x-2)|+c$

7. $\int\frac{1}{x(x^2+1)}dx$ is equal to

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

(c) $-\log|x|+\frac{1}{2}\log(x^2+1)+c$ (d) $\frac{1}{2}\log|x|+\frac{1}{2}\log(x^2+1)+c$

8. $\int x^2e^{x^3}dx$ is equal to

(a) $\frac{1}{3}e^{x^3}+c$ (b) $\frac{1}{3}e^{x^2}+c$ (c) $\frac{1}{2}e^{x^3}+c$ (d) $\frac{1}{2}e^{x^2}+c$

9. $\int e^x\sec x(1+\tan x)dx$ is equal to

$(a)\ e^x cosx + c$ $(b)\ e^x secx + c$ $(c)\ e^x sinx + c$ $(d)\ e^x tanx + c$

10. $\int \sqrt{1+x^2}dx$ is equal to

$(a) \frac{x}{2}\sqrt{1+x^2} + \frac{1}{2}\log\left|x+\sqrt{1+x^2}\right| + c$ $(b) \frac{x^2}{2}\sqrt{1+x^2} + \frac{1}{2}x^2\log\left|x+\sqrt{1+x^2}\right| + c$

$(c) \frac{2}{3}(1+x^2)^{\frac{3}{2}} + c$ $(c) \frac{2}{3}x(1+x^2)^{\frac{3}{2}} + c$

11. $\int \sqrt{x^2-8x+7}dx$ is equal to

$(a) \frac{1}{2}(x-4)\sqrt{x^2-8x+7} + 9\log(x-4) + \sqrt{x^2-8x+7} + + c$

$(b) \frac{1}{2}(x+4)\sqrt{x^2-8x+7} + 9\log(x+4) + \sqrt{x^2-8x+7} + + c$

$(c) \frac{1}{2}(x-4)\sqrt{x^2-8x+7} - 3\sqrt{2}\log(x-4) + \sqrt{x^2-8x+7} + + c$

$(d) \frac{1}{2}(x-4)\sqrt{x^2-8x+7} - \frac{9}{2}\log(x-4) + \sqrt{x^2-8x+7} + + c$

12. Evaluate $\int(\sin x + \cos x)\,dx$.

(a) $sinx - cosx + c$ (b) $-sinx - cosx + c$ (c) $sinx + cosx + c$ (d) $-sinx + cosx + c$

13. Evaluate $\int(2x - 3\cos x + e^x)\cdot dx$.

(a) $2x^2 - 3sinx + e^x + c$ (b) $x^2 - 3sinx + e^x + c$

(c) $2x^2 + 3sinx + e^x + c$ (d) $2x^2 - 3sinx + e^x + c$

14. Evaluate $\int e^x\left(\frac{x-1}{x^2}\right)\cdot dx$.

(a) $\frac{e^x}{x} + c$ (c) $\frac{e^x}{x^2} + c$ (c) $\frac{e^{-x}}{x} + c$ (d) $\frac{e^{x^2}}{x} + c$

15. Evaluate $\int \sec x(\sec x + \tan x)\cdot dx$.

(a) $secx + tanx + c$ (b) $secx - tanx + c$ (c) $-secx + tanx + c$ (d) $-secx - tanx + c$

16. Evaluate $\int \text{cosecx}(\text{cosecx} - \text{cotx})\cdot dx$.

(a) $secx - tanx + c$ (b) $cosecx - tanx + c$ (c) $cosecx - cotx + c$ $-cosecx - cotx + c$

17. Find the anti-derivative of $x^2\left(1-\frac{1}{x^2}\right)$ with respect to x.

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

18. Evaluate $\int \tan^2 2x\cdot dx$.

(a) $\frac{tan2x}{2} - x + c$ (b) $2secxtanx - x + c$ (c) $\frac{tan2x}{2} + x + c$ (d) $\frac{tan2x}{\frac{1}{2}} - x + c$

19. Evaluate $\int \sin(2+5x)\cdot dx$.

(a) $\frac{1}{5}\cos(2+5x)+c$ (b) $\cos(2+5x)+c$ (c) $\frac{1}{5}\sin(2+5x)+c$ (d) $-\frac{1}{5}\cos(2+5x)+c$

20. Evaluate $\int \frac{1-x}{\sqrt{x}}\cdot dx$.

(a) $2\sqrt{x}+\frac{2}{3}x^{\frac{3}{2}}+c$ (b) $2\sqrt{x}-\frac{2}{3}x^{\frac{3}{2}}+c$ (c) $\sqrt{x}+\frac{2}{3}x^{\frac{3}{2}}+c$ (d) $-2\sqrt{x}-\frac{2}{3}x^{\frac{3}{2}}+c$

21. Find an anti-derivative of $\cot^2 x$ with respect to x.

(a) $cotx-x+c$ (b) $cotx+x+c$ (c) $-cotx+x+c$ (d) $-cotx-x+c$

22. Find an anti-derivative of $\sqrt{1+\sin 2x}$ with respect to x.

(a) $sinx+cosx+c$ (b) $sinx-cosx+c$ (c) $-sinx-cosx+c$ (d) $-sinx+cosx+c$

23. Evaluate $\int cotxdx$.

(a) $\log(cosx)+c$ (b) $\log(sinx)+c$ (c) $\log(secxx)+c$ (d) $-\log(sinx)+c$

24. Evaluate $\int e^{2\log_e^x}\cdot dx$.

(a) $2x$ (b) $\frac{2x^2}{3}$ (c) $\frac{x^3}{3}$ (d) x

25. Evaluate $\int \frac{dx}{\sqrt{1+x}}$.

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

26. Evaluate $\int\left(\sin^{-1}x+\cos^{-1}x\right)\cdot dx$.

(a) $\frac{\pi}{2}+c$ (b) $\frac{\pi}{2}x+c$ (c) $-\frac{\pi}{2}+c$ (d) $-\frac{\pi}{2}x+c$

27. Evaluate $\int \log x\cdot dx$.

(a) $\frac{1}{x}+c$ (b) $x(logx+1)+c$ (c) $x(logx-1)+c$ (d) $(logx+1)+c$

28. Evaluate $\int \frac{x^2}{1+x^2}dx$.

(a) $x+\tan^{-1}x+c$ (b) $x-\tan^{-1}x+c$ (c) $x+\log x+c$ (d) $x\tan^{-1}x+c$

29. Evaluate $\int e^x\left(\tan x+\sec^2 x\right)dx$.

(a) $e^x secx+c$ (b) $e^x+secx+$ (c) $e^x tanx+c$ (d) $e^x+tanx+c$

30. Evaluate $\int e^{2\log_e \sec x}dx$.

(a) $secx+c$ (b) $tanx+c$ (c) $2secxtanx+c$ (d) $secx+tanx+c$

31. Evaluate $\int \sec^2(7-4x)dx$.

(a) $\tan(7-4x)+c$ (b) $\frac{1}{4}\tan(7-4x)+c$ (c) $-\frac{1}{4}\tan(7-4x)+c$ (d) $\tan(x)+c$

32. Evaluate $\int \frac{\log x}{x}dx$.

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

33. Write the value of $\int \frac{dx}{x^2+16}$.

(a) $\frac{1}{4}\tan^{-1}x+c$ (b) $\frac{1}{4}\tan^{-1}\frac{x}{4}+c$ (c) $\tan^{-1}x+c$ (d) $\log(x^2+16)+c$

34. Evaluate $\int \frac{10x^9+10^x \log_e 10}{x^{10}+10^x}dx$.

(a) $x^{10}+10^x+c$ (b) $\log(x^{10}+10^x)+c$ (c) $x^{10}-10^x+c$ (d) $\log(x^{10}-10^x)+c$

35. Evaluate $\int \frac{\sin^2 x-\cos^2 x}{\sin^2 x\cos^2 x}dx$.

(a) $tanx-cotx+c$ (b) $tanx+cotx+c$ (c) $-tanx-cotx+c$ (d) $-tanx+cotx+c$

2 MARKERS (1 - …………Q.No. 26)

1. Evaluate $\int \frac{\cos 2x-\cos 2\alpha}{\cos x-\cos\alpha}\cdot dx$.
2. Evaluate $\int \frac{\sin^2 x}{1+\cos x}dx$
3. Evaluate $\int \frac{dx}{x-\sqrt{x}}$.
4. Evaluate $\int \frac{x^2}{1-x^6}\cdot dx$.
5. Evaluate $\int e^x\left(\frac{1}{x}-\frac{1}{x^2}\right)\cdot dx$ or $\int e^x\left(\frac{x-1}{x^2}\right)\cdot dx$.
6. Evaluate $\int \sin^3 x\cdot dx$.
7. Evaluate $\int \frac{\cos 2x}{(\sin x+\cos x)^2}\cdot dx$.
8. Evaluate $\int \frac{\cos 2x+2\sin^2 x}{\cos^2 x}\cdot dx$.
9. Find $\int \frac{1}{\sin x\cos^3 x}dx$.
10. Evaluate $\int \sin 3x\cdot\cos 4x\cdot dx$.
11. Evaluate $\int \frac{e^{2x}-1}{e^{2x}+1}\cdot dx$.

12. Integrate: $\frac{x^3}{x+1}$ with respect to x.

13. Evaluate $\int \frac{x^3}{\sqrt{1-x^8}} \cdot dx$.

14. Evaluate $\int \frac{2-3\sin x}{\cos^2 x} \cdot dx$.

15. Evaluate $\int e^x \left(\tan^{-1} x + \frac{1}{1+x^2} \right) \cdot dx$.

16. Evaluate $\int e^x \left(1+\tan x + \tan^2 x \right) \cdot dx$

17. Evaluate $\int \log\left(\sin x \right) \cdot \cot x \cdot dx$.

18. Find the anti-derivative of $\frac{e^x \left(1+x \right)}{\cos^2\left(e^x \cdot x \right)}$ with respect to x.

19. Evaluate $\int \frac{e^{5\log x} - e^{4\log x}}{e^{3\log x} - e^{2\log x}} \cdot dx$.

20. Evaluate $\int \frac{dx}{x + x\log x}$.

21. Integrate $\frac{\tan^4 \sqrt{x} \cdot \sec^2 \sqrt{x}}{\sqrt{x}}$ with respect to x.

22. Evaluate $\int \frac{\sin\left(\tan^{-1} x \right)}{1+x^2} \cdot dx$.

23. Evaluate $\int \frac{\cos\sqrt{x}}{\sqrt{x}} \cdot dx$.

24. Evaluate $\int \frac{dx}{\sin^2 x \cos^2 x}$.

25. Evaluate $\int \frac{1-\cos x}{1+\cos x} \cdot dx$.

26. Evaluate $\int \frac{4x+1}{\sqrt{2x^2+x-3}} \cdot dx$

27. Evaluate $\int \sqrt{4-x^2}$

28. Evaluate $\int \cos^3 x \cdot e^{\log \sin x} \cdot dx$.

29. Find: $\int x^2 \log x \, dx$.

3 MARKERS (2…….Q.No. 35, 36)

1. Find $\int \frac{\left(x^2+1\right)e^x}{\left(x+1\right)^2}\cdot dx$.

2. Evaluate $\int \tan^{-1}x\cdot dx$.

3. Evaluate $\int \sin 3x\cdot \sin 4x\cdot dx$.

4. Integrate $x^2\cdot e^x$ with respect to x.

5. Evaluate $\int x\cdot \tan^{-1}x\cdot dx$.

6. Evaluate $\int \frac{x}{\left(x+1\right)\left(x+2\right)}\cdot dx$.

7. Evaluate $\int \frac{\left(1+\log x\right)^2}{x}\cdot dx$.

8. Evaluate $\int \frac{x\cdot \sin^{-1}x}{\sqrt{1-x^2}}\cdot dx$

9. Evaluate $\int e^x\left(\frac{1+\sin x}{1+\cos x}\right)\cdot dx$.

10. Evaluate $\int \frac{dx}{x\left(x^n+1\right)}$.

11. Evaluate $\int e^x\cdot \sin x\cdot dx$.

12. Integrate: $\frac{\sin x}{\sin\left(a+x\right)}$ with respect to x.

13. Evaluate $\int \frac{1}{1+\tan x}\cdot dx$.

14. Integrate $\frac{\left(x-3\right)e^x}{\left(x-1\right)^3}$ with respect to x.

15. Find $\int \frac{e^x}{\left(1+e^x\right)\left(2+e^x\right)}\cdot dx$.

16. Evaluate $\int \frac{\sin x}{\sin x+\cos x}\cdot dx$.

17. Evaluate $\int \sin^3 x\cdot \cos^2 x\cdot dx$.

18. Evaluate $\int \tan^4 x\cdot dx$.

19. Integrate $\sin x\cdot \sin 2x\cdot \sin 3x$.

20. Evaluate $\int \frac{2x}{(x^2+1)(x^2+3)} \cdot dx$.

21. Evaluate $\int (\sin^{-1} x)^2 \cdot dx$.

22. Evaluate $\int x \sin^{-1} x \, dx$

5 MARKERS (1………Q.No.47)

1. Find the integral of $\frac{1}{x^2-a^2}$ with respect to x and hence evaluate $\int \frac{x}{x^4-16} \cdot dx$.

2. Find the integral of $\frac{1}{a^2-x^2}$ with respect to x and hence evaluate $\int \frac{x^2}{1-x^6} \cdot dx$.

3. Find the integral of $\frac{1}{\sqrt{x^2+a^2}}$ with respect to x and hence evaluate $\int \frac{1}{\sqrt{x^2+2x+2}} \cdot dx$

4. Find the integral of $\sqrt{x^2+a^2}$ with respect to x and hence evaluate $\int \sqrt{4x^2+9} \cdot dx$.

5. Find the integral of $\frac{1}{\sqrt{a^2-x^2}}$ with respect to x and hence evaluate $\int \frac{dx}{\sqrt{7-6x-x^2}}$.

6. Find the integral of $\frac{1}{\sqrt{x^2-a^2}}$ with respect to x and hence evaluate $\int \frac{1}{x^2-25} \cdot dx$

7. Find the integral of $\sqrt{a^2-x^2}$ with respect to x and hence evaluate $\int \sqrt{1+4x-x^2} \, dx$.

8. Find the integral of $\frac{1}{x^2+a^2}$ with respect to x and hence evaluate $\int \frac{1}{3+2x+x^2} dx$.

9. Find the integral of $\sqrt{x^2-a^2}$ with respect to x and hence evaluate $\int \sqrt{x^2-8x+7} \, dx$.

Chapter – 8 DEFFINITE INT.

BRIKS ACADEMY PADMANABHANAGAR CONT: 9900084667

2 Marks – 1; 6 Marks – 1

2 MARKS (1.....Q.No. 27)

30. Evaluate $\int_1^e \frac{1}{x}\cdot dx$.

31. Evaluate $\int_2^3 \frac{x}{x^2+1}\cdot dx$.

32. Evaluate $\int_0^{\pi/2} \cos 2x\cdot dx$.

33. Evaluate $\int_0^2 x\sqrt{x+2}\cdot dx$.

34. Evaluate $\int_2^3 \frac{x}{x^2+1}\cdot dx$.

35. Evaluate $\int_{-\pi/2}^{\pi/2} \sin^2 x\cdot dx$.

36. Evaluate $\int_0^1 \frac{\left(\sin^{-1}x\right)^2}{\sqrt{1-x^2}}\cdot dx$

37. Evaluate $\int_0^{2/3} \frac{dx}{4+9x^2}$.

38. Evaluate $\int_0^{\pi/4} \tan x\cdot dx$.

39. Evaluate: $\int_0^1 \frac{dx}{\sqrt{1-x^2}}$.

40. Evaluate $\int_0^{\pi}\left(\sin^2\frac{x}{2}-\cos^2\frac{x}{2}\right)dx$.

41. Evaluate $\int_0^1 \frac{1}{1+x^2}\cdot dx$.

SIX MARK QUESTIONS (1........Q.No. 51)

1. Prove that $\int_0^a f(x)dx=\int_0^a f(a-x)dx$ and hence evaluate $\int_0^{\frac{\pi}{2}} \log(\sin x)dx$.

2. Prove that $\int_a^b f(x)\,dx = \int_a^c f(x)\,dx + \int_c^b f(x)\,dx$ and hence evaluate $\int_{-1}^{2} \left| x^3 - x \right| dx$.

3. Prove that $\int_0^{2a} f(x)\,dx = \begin{cases} 2\int_0^a f(x)\,dx & if \quad f(2a-x) = f(x) \\ 0 & if \quad f(2a-x) = f(x) \end{cases}$ and hence evaluate $\int_0^{\pi} \frac{1}{a^2\cos^2 x + b^2 \sin^2 x}\,dx$.

4. Prove that $\int_a^b f(x)\,dx = \int_a^b f(a+b-x)\,dx$ and hence evaluate $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{1}{1+\sqrt{\tan x}}\,dx$.

5. Prove that $\int_{-a}^{a} f(x)\,dx = \begin{cases} 2\int_0^a f(x)\,dx & if \quad f(x) \text{ is even} \\ 0 & if \quad f(x) \text{ is odd} \end{cases}$ and evaluate $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^7 x\,dx$.

Chapter – 9 DIFERENTIAL EQN.

BRIKS ACADEMY PADMANABHANAGAR CONT: 9900084667

FB – 1; 3 Marks – 1; 5 Marks – 1

FILL IN THE BLANKS:(1.....Q.No. 18)

1. Find the order and degree of the differential equation $xy\frac{d^2y}{dx^2}+x\left(\frac{dy}{dx}\right)^2-y\cdot\frac{dy}{dx}=0$ ....

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

3. Find the order and degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^3+\left(\frac{dy}{dx}\right)^2+\sin\left(\frac{dy}{dx}\right)+1=0$ ....

4. Find the order and degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^2+\cos\left(\frac{dy}{dx}\right)=0$ ....

5. Find the order and degree (if defined) of the differential equation $\frac{d^4y}{dx^4}+\sin\left(\frac{d^3y}{dx^3}\right)=0$. ....

6. Find the order and degree of the differential equation $\left(\frac{ds}{dt}\right)^4+3s\frac{d^2s}{dt^2}=0$ ....

7. Find the order and degree of the differential equation $\frac{d^3y}{dx^3}+\frac{d^2y}{dx^2}+\frac{dy}{dx}=0$ ....

8. The order and degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^3-5\cdot\frac{dy}{dx}+6=0$ ....

9. The order of the differential equation $y'''+2y''+y'=0$ ....

10. The degree of the differential equation $\frac{dy}{dx}+\sin\left(\frac{dy}{dx}\right)=0$ ....

3 MARKERS (1.........Q.No. 39)

23. Find the equation of the curve through the point $(-2,3)$ given that the slope of the tangent at any point (x,y) is $\frac{2x}{y^2}$.

24. Find the equation of the curve passing through the point $(1,1)$, given that the slope of the tangent to the curve at any point is $\frac{x}{y}$.

25. Solve the differential equation $x^2 \cdot \frac{dy}{dx} = x^2 - 2y^2 + xy$.

26. For the differential equation $xy \cdot \frac{dy}{dx} = (x+2)(y+2)$, find the solution curve passing through the point $(1,-1)$.

27. Find the general solution of the differential equation $\frac{dy}{dx} = \frac{1-\cos x}{1+\cos x}$.

28. Find the equation of a curve passing through the point $(0,0)$ and whose differential equation is $y' = e^x \sin x$.

Find the particular solution of the differential equation $\frac{dy}{dx} = -4xy^2$ given that $y=1$ when $x=0$

5 MARKERS (1..........Q.No. 49)

10. Find the general solution of the differential equation $e^x.\tan y.dx + (1-e^x).\sec^2 y.dy = 0$.

11. Solve: $(x\log x)\frac{dy}{dx} + y = \frac{2}{x}(\log x)$.

12. Solve the differential equation $\frac{dy}{dx} + (\sec x)y = \tan x\left(0 \le x < \frac{\pi}{2}\right)$.

13. Find the general solution of the differential equation, $(x+3y^2)\frac{dy}{dx} = y(y>0)$.

14. Solve the differential equation $y.dx - (x+2y^2).dy = 0$.

15. Find the general solution of the differential equation $\frac{dy}{dx} - y = \cos x$.

16. Find the general solution of the differential equation $x\frac{dy}{dx} + 2y = x^2 (x \ne 0)$.

17. Solve the differential equation $x\frac{dy}{dx} + 2y = \sin x$.

18. Solve the differential equation $\frac{dy}{dx} + 3y = e^{-2x}$.

19. Solve the differential equation $\frac{dy}{dx} + 3y = e^{-2x}$.

20. Solve the differential equation $\cos^2 x\frac{dy}{dx} + y = \tan x\left(0 \le x < \frac{\pi}{2}\right)$.

21. Solve the differential equation $\frac{dy}{dx}+\frac{y}{x}=x^2$.

22. Find the general solution of the differential equation $x\frac{dy}{dx}+2y=x^2\log x$.

23. Find the general solution of the differential equation $\left(1+x^2\right)dy+2xy\,dx=\cot x\,dx\,(x\neq 0)$.

24. Find the general solution of the differential equation $x\frac{dy}{dx}+y-x+xy\cot x=0\,(x\neq 0)$.

25. Solve the differential equation $(x+y)\frac{dy}{dx}=1$.

26. Solve the differential equation $y\,dx+\left(x-ye^y\right)dy=0$.

27. Solve the differential equation $y\,dx+\left(x-y^2\right)dy=0$.

28. Solve the differential equation $\left(x+3y^2\right)\frac{dy}{dx}=y\,(y>0)$.

Chapter – 10 AREA

BRIKS ACADEMY **PADMANABHANAGAR** **CONT: 9900084667**

5 Marks – 1

5 MARKS (1…………Q.No. 48)

29. Find the area of the circle $x^2 + y^2 = a^2$ by the method of the integration **OR** find the area of the circle $x^2 + y^2 = 4$.

30. Find the area of ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ **OR** Find the area of ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$

Chapter – 11 VECTORS

BRIKS ACADEMY PADMANABHANAGAR CONT: 9900084667

MCQ'S –2; 2 Marks – 1; 3 Marks – 2

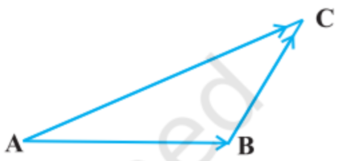
MCQ'S:(2…………Q.No. 11, 12)

1. If θ is the angle between $\vec{a}$ *and* $\vec{b}$ then $\vec{a}\,.\vec{b} \geq 0$ if only when
(a) $0 < \theta < \frac{\pi}{2}$ (b) $0 \leq \theta \leq \frac{\pi}{2}$ (c) $0 < \theta < \pi$ (d) $0 \leq \theta \leq \pi$

2. Let $\vec{a}$ *and* $\vec{b}$ be two unit vectors and θ is the angle between them. Then $\vec{a} + \vec{b}$ is unit vector if
(a) $\theta = \frac{\pi}{4}$ (c) $\theta = \frac{\pi}{3}$ (c) $\theta = \frac{\pi}{2}$ (d) $\theta = \frac{2\pi}{3}$

3. If is a nonzero vector of magnitude 'a' and λ a nonzero scalar, then $\lambda\vec{a}$ is unit vector if
(a) λ = 1 (b) λ = – 1 (c) a = |λ| (d) a = 1/|λ|

4. In triangle ABC, which of the following is not true:
(a) $\overrightarrow{AB} + \overrightarrow{BC} + \overrightarrow{CA} = \vec{0}$ (b) $\overrightarrow{AB} + \overrightarrow{BC} - \overrightarrow{AC} = \vec{0}$
(c) $\overrightarrow{AB} + \overrightarrow{BC} - \overrightarrow{AC} = \vec{0}$ (d) $\overrightarrow{AB} - \overrightarrow{CB} + \overrightarrow{CA} = \vec{0}$



5. If $\vec{a}$ and $\vec{b}$ are two collinear vectors, then which of the following are incorrect:
(a) $\vec{b} = \lambda\,\vec{a}$ for some scalar λ
(b) $\vec{a} = \pm\,\vec{b}$
(c) the respective components of are not proportional
(d) both the vectors have same direction, but different magnitudes.

6. Let the vectors be such that $\vec{a}$ *and* $\vec{b}$ be such that $|\vec{a}| = 3$ and $|\vec{b}| = \frac{\sqrt{2}}{3}$, then $\vec{a} \times \vec{b}$ is a unit vector, if the angle between is
(a) π/6 (b) π/4 (c) π/3 (d) π/2

7. The value of $\hat{\imath}.(\hat{\jmath} \times \hat{k}) + \hat{\jmath}.(\hat{k} \times \hat{\imath}) + \hat{k}.(\hat{\imath} \times \hat{\jmath})$ is
(a) 0 (c) -1 (c) 1 (d) 3

8. A unit vector parallel to the sum of the vectors 2i + 3j – k and 4i + 2j + k is
a. $\frac{6i+5j}{\sqrt{61}}$ b. $\frac{5i+6j}{\sqrt{61}}$ c. k d. none of these

9. If $|\vec{a}+\vec{b}| = |\vec{a}-\vec{b}|$ then
(a) $\vec{a}$ and $\vec{b}$ are perpendicular c. $|\vec{a}| = |\vec{b}|$
(b) $\vec{a}$ and $\vec{b}$ are parallel d. there is no relationship between $\vec{a}$ and $\vec{b}$

10. Given $\vec{a}$ = i + j – k, $\vec{b}$ = -i + 2j + k and $\vec{c}$ = -i + 2j – k, a unit vector perpendicular to both $\vec{a} + \vec{b}$ and $\vec{b} + \vec{c}$ is

a. i b. j c. k d. $\frac{i+j+k}{\sqrt{3}}$

11. The direction cosiness of the vector, 3i – 4j + 5k are

a. $\frac{3}{\sqrt{2}},\frac{-4}{\sqrt{2}},\frac{1}{\sqrt{2}}$ b. $\frac{3}{5},-\frac{4}{5},\frac{1}{5}$ c. $\frac{3}{5\sqrt{2}},\frac{-4}{5\sqrt{2}},\frac{1}{\sqrt{2}}$ d. $\frac{3}{5\sqrt{2}},\frac{4}{5\sqrt{2}},\frac{1}{\sqrt{2}}$

12. The area of the triangle two of whose sides are given by 4i – j + k and 3i + j – k is

a. $7\sqrt{2}$ b. $14\sqrt{2}$ c. $\frac{14}{\sqrt{2}}$ d. $\frac{7}{\sqrt{2}}$

13. The adjacent sides of a parallelogram are i + 2j + 3k and 2i – j + k. its area is

a. $3\sqrt{5}$ b. $5\sqrt{3}$ c. $\sqrt{15}$ d. $\frac{5\sqrt{3}}{2}$

14. The projection of $\vec{a}=3i+2k$ on the vector $\vec{b}=2i+3j+k$ is,

a. $\frac{8}{\sqrt{35}}$ b. $\frac{8}{\sqrt{39}}$ c. $\frac{8}{\sqrt{14}}$ d. $\sqrt{14}$

15. The sine of the angle between the vectors 3i + j + 2k and i + j + 2k is

a. $\sqrt{\frac{5}{22}}$ b. $\sqrt{\frac{5}{12}}$ c. $\sqrt{\frac{15}{22}}$ d. $\sqrt{\frac{5}{21}}$

16. If $\left|\vec{a}+\vec{b}\right|^2=\left|\vec{a}\right|^2+\left|\vec{b}\right|^2$, then

(a) $\vec{a}$ is parallel to $\vec{b}$ c. $\vec{a}=\vec{b}$

(b) $\vec{a}$ is perpendicular to $\vec{b}$ d. $\left|\vec{a}+\vec{b}\right|=\left|\vec{a}\right|+\left|\vec{b}\right|$

17. If θ is the angle between the vectors $\vec{a}$ and $\vec{b}$ then $\frac{\left|\vec{a}\times\vec{b}\right|}{\vec{a}\cdot\vec{b}}=$

a. cot θ b. - cot θ c. tan θ d. - tan θ

18. For any vector $\vec{a}$, $\left(\vec{a}\cdot i\right)i+\left(\vec{a}\cdot j\right)j+\left(\vec{a}\cdot k\right)k=$ (KCET 2004)

a. $\vec{a}$ b. 2 $\vec{a}$ c. 3 $\vec{a}$ d. $\vec{0}$

19. If $\left|\vec{a}\right|$=5, $\left|\vec{b}\right|$=6 and the angle between $\vec{a}$ and $\vec{b}$ is 60^0, then $\vec{a}\cdot\vec{b}=$

a. 30 b. 15 c. $15\sqrt{3}$ d. $5\sqrt{3}$

20. If $\left|\vec{a}\times\vec{b}\right|=4$ and $\left|\vec{a}\cdot\vec{b}\right|=2$ then $\left|\vec{a}\right|^2\cdot\left|\vec{b}\right|^2=$

a. 6 b. 2 c. 20 d. 8

21. i.(j x k) + j. (k x i) + k. (i x j) =

a. 1 b. 3 c. -3 d. 0

(Kar CET 1994)

22. If any vector $\vec{a}$ $i\times\left(\vec{a}\times i\right)+j\times\left(\vec{a}\times j\right)+k\times\left(\vec{a}\times k\right)=$

a. i + j + k b. $3\vec{a}$ c. $2\vec{a}$ d. $\vec{a}$

23. The projection of $\vec{a}=5i-j+3k$ on $\vec{b}=2i+j-k$ is

a. 6 b. $\sqrt{6}$ c. $\sqrt{3}$ d. none of these

24. If $|\vec{a}| = 5$, $|\vec{b}| = 6$, $\vec{a}\cdot\vec{b} = 24$ then $|\vec{a}\times\vec{b}| =$

a. $\sqrt{224}$ b. 18 c. $\sqrt{300}$ d. $\sqrt{254}$

25. If $\vec{a}$ and $\vec{b}$ are unit vectors and $|\vec{a}\times\vec{b}| = 1$ then the angle between $\vec{a}$ and $\vec{b}$ is

a. $\frac{\pi}{4}$ b. $\frac{\pi}{2}$ c. $\frac{\pi}{3}$ d. π

26. If θ is the angle between $\vec{a}$ and $\vec{b}$ and $|\vec{a}\times\vec{b}| = |\vec{a}.\vec{b}|$, the $\theta =$

a. 0 b. π c. $\frac{\pi}{2}$ d. $\frac{\pi}{4}$

27. Unit vector in the direction of $\vec{a} = 2\hat{\imath} + 3\hat{\jmath} + \hat{k}$ is

(a) $\frac{2\hat{\imath}+3\hat{\jmath}+\hat{k}}{14}$ b. $\frac{2\hat{\imath}-3\hat{\jmath}+\hat{k}}{14}$ c. $\frac{2\hat{\imath}+3\hat{\jmath}+\hat{k}}{\sqrt{14}}$ d. $\frac{2\hat{\imath}+3\hat{\jmath}-\hat{k}}{14}$

28. If α, β, γ are the angles that a line makes with the positive direction of x, y, z axis, respectively, then the direction cosines of the line are:

(a) $\sin\alpha, \sin\beta, \sin\gamma$ (b) $\cos\alpha, \cos\beta, \cos\gamma$ (c) $\tan\alpha, \tan\beta, \tan\gamma$ (d) $\cos^2\alpha, \cos^2\beta, \cos^2\gamma$

29. A line makes equal angles with co-ordinate axis. Direction cosines of this line are:

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

25. If the direction cosine l, m, n of a line are 0, $\frac{1}{2}, \frac{\sqrt{3}}{2}$ then the angle made by the line with positive direction of y – axis is

(a) 60^0 (b) 30^0 (c) 90^0 (d) 45^0

26. If $\vec{a}$ is a non zero vector of magnitude 'a' and $\lambda\vec{a}$ is a unit vector, find the value of λ.

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

27. the direction ratios of the vector $\vec{a} = \hat{i} + \hat{j} - 2k$.

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

28. The magnitude of the vector $\vec{a} = \frac{1}{\sqrt{3}}\hat{i} + \frac{1}{\sqrt{3}}\hat{j} - \frac{1}{\sqrt{3}}k$ is

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

29. The vectors $2\hat{i} - 3\hat{j} + 4k$ and $-4\hat{i} + 6\hat{j} - 8k$ are

(a) Co-planar vectors (b) collinear vectors

(c) perpendicular vectors (d) both are zero vectors

32. The vectors $3\hat{i} - 6\hat{j} + 2k$ and $6\hat{i} + 2\hat{j} - 3k$ are

(a) perpendicular to each other. (b) parallel to each other.

(b) Collinear vectors (d) coplanar vectors

33. If $\vec{a}\cdot\vec{a} = 0$ and $\vec{a}\cdot\vec{b} = 0$, then what can you concluded about the vector $\vec{b}$?

(a) Zero vector (b) unit vector

(b) $\vec{b}$ (d) any vector

34. If the vectors $2\hat{i} + 3\hat{j} - 6k$ and $4\hat{i} - m\hat{j} - 12k$ are parallel, find 'm' is ……………..

35. The value of x, for which $x\left(\hat{i} + \hat{j} + k\right)$ is a unit vector is ………….

36. The value of $\hat{i}\cdot\left(\hat{j}\times k\right)+\hat{j}\cdot\left(\hat{i}\times k\right)+k\cdot\left(\hat{i}\times\hat{j}\right)$ is …………

37. If $\vec{a}=2\hat{i}-\hat{j}+k$ and $\vec{b}=\hat{i}-3\hat{j}-3k,$ then $\vec{a}\cdot\vec{b}$ = …………

38. If $\vec{a}=2\hat{i}+\hat{j}+3k$ and $\vec{b}=3\hat{i}+5\hat{j}-2k$. $|\vec{a}\times\vec{b}|$ = ……………..

39. The value of $\lambda,$ the vectors $\vec{a}=2\hat{i}-3\lambda\hat{j}+k$ and $\vec{b}=\hat{i}+\hat{j}-2k$ are perpendicular to each other is …………………

40. The value of $\lambda,$ for which vector $\frac{2}{3}\hat{i}-\lambda\hat{j}+\frac{2}{3}k$ is a unit vector is……………..

41. If $\vec{a}$ is a unit vector such that $\left(\vec{x}-\vec{a}\right)\cdot\left(\vec{x}+\vec{a}\right)=8,$ find $\left|\vec{x}\right|$ =……………..

TWO MARKS QUESTIONS :(1…….Q.NO. 28)

1. Find $\left|\vec{x}\right|,$ if for a unit vector $\vec{a},$ $\left(\vec{x}-\vec{a}\right)\cdot\left(\vec{x}+\vec{a}\right)=12$.

2. Find the area of a parallelogram whose adjacent sides are given by the vectors $\vec{a}=3\hat{i}+\hat{j}+4k$ and $\vec{b}=\hat{i}-\hat{j}+k$.

3. Obtain the projection of the vector $\vec{a}=2\hat{i}+3\hat{j}+2k$ on the vector $\vec{b}=\hat{i}+2\hat{j}+k$.

4. Find $\left|\vec{b}\right|,$ if $\left(\vec{a}+\vec{b}\right)\cdot\left(\vec{a}-\vec{b}\right)=8$ and $\left|\vec{a}\right|=8\left|\vec{b}\right|$.

5. If $\left|\vec{a}+\vec{b}\right|=\left|\vec{a}-\vec{b}\right|$, prove that $\vec{a}$ and $\vec{b}$ are perpendicular.

6. Find a vector in the direction of the vector $\vec{a}=2\hat{i}+3\hat{j}+k$ that has magnitude 7 units.

7. If $\vec{a}=5\hat{i}-\hat{j}-3k$ and $\vec{b}=\hat{i}+3\hat{j}+5k,$ then show that the vectors $\vec{a}+\vec{b}$ and $\vec{a}-\vec{b}$ are perpendicular.

8. Show that $\left(\vec{a}-\vec{b}\right)\times\left(\vec{a}+\vec{b}\right)=2\left(\vec{a}\times\vec{b}\right)$.

9. If either $\vec{a}=\vec{0}$ or $\vec{b}=\vec{0}$ then $\vec{a}\cdot\vec{b}=0,$ but the converse need not be true. Justify your answer.

10. Show that the vector $\hat{i}+\hat{j}+k$ is equally inclined to the positive directions of the co-ordinate axes.

11. Find the values of λ and μ if $\left(2\hat{i}+b\hat{j}+27k\right)\times\left(\hat{i}+\lambda\hat{j}+\mu k\right)=\vec{0}$.

12. Find the angle between the vectors $\hat{i}-\hat{j}+k$ and $\hat{i}+\hat{j}-k$.

13. Show that the points $A\left(1,2,7\right),$ $B\left(2,6,3\right)$ and $C\left(3,10,-1\right)$ are collinear.

14. For given vectors, $\vec{a}=2\hat{i}-\hat{j}+2k$ and $\vec{b}=-\hat{i}+\hat{j}-k$, find the unit vector in the direction of the vector $\vec{a}+\vec{b}$

15. Find the direction cosines of the vector joining the points $A\left(1,\ 2,\ -3\right)$ and $B\left(-1,\ -2,\ 1\right),$ directed from A to B.

16. Find $\left|\vec{a}-\vec{b}\right|$, if two vectors $\vec{a}$ and $\vec{b}$ are such that $\left|\vec{a}\right|=2,\ \left|\vec{b}\right|=3$ and $\vec{a}\cdot\vec{b}=4$.

17. If $\vec{a}=2\hat{i}+2\hat{j}+3k,\ \vec{b}=-\hat{i}+2\hat{j}+k$ and $\vec{c}=3\hat{i}+\hat{j}$ are such that $\vec{a}+\lambda\vec{b}$ is perpendicular to $\vec{c}$, then find the value of λ.

18. If $\vec{a},\ \vec{b},\ \vec{c}$ are unit vectors such that $\vec{a}+\vec{b}+\vec{c}=\vec{0}$, find the value of $\vec{a}\cdot\vec{b}+\vec{b}\cdot\vec{c}+\vec{c}\cdot\vec{a}$.

19. Find $\left|\vec{a}\times\vec{b}\right|$, if $\vec{a}=\hat{i}-7\hat{j}+7k$ and $\vec{b}=3\hat{i}-2\hat{j}+2k$.

20. Find the position vector of a point R which divides the line joining two points P and Q whose position vectors are $\hat{i}+2\hat{j}-k$ and $-\hat{i}+\hat{j}+k$ respectively in the ratio $2:1$ (i) internally (ii) externally.

21. Consider two points P and Q with position vectors $\overrightarrow{OP}=3\vec{a}-2\vec{b}$ and $\overrightarrow{OQ}=\vec{a}+\vec{b}$. Find the position vector of a point R which divides the line segment joining P and Q in the ratio $2:1$ (i) internally (ii) externally.

THREE MARKS: (2.........Q.No. 40, 41)

1. If $\vec{a}=2\hat{i}+2\hat{j}+3k,\ \ \vec{b}=-\hat{i}+2\hat{j}+k$ and $\vec{c}=3\hat{i}+\hat{j}$ are such that $\vec{a}+\lambda\vec{b}$ is perpendicular to $\vec{c}$, then find the value of λ.

2. Find a unit vector perpendicular to each of the vectors $\left(\vec{a}+\vec{b}\right)$ and $\left(\vec{a}-\vec{b}\right)$ where $\vec{a}=\hat{i}+\hat{j}+k,\ \vec{b}=\hat{i}+2\hat{j}+3k$.

3. Show that the position vector of a point P, which divides the line joining the points A and B having position vectors $\vec{a}$ and $\vec{b}$ internally in the ratio $m:n$ is $\dfrac{m\,\vec{b}+n\,\vec{a}}{m+n}$.

4. Find the area of a triangle having the points $A(1,\ 1,\ 1)$, $B(1,\ 2,\ 3)$ and $C(2,\ 3,\ 1)$ as its vertices using vector method.

5. The vectors $\vec{a},\ \vec{b}$ and $\vec{c}$ satisfy the condition $\vec{a}+\vec{b}+\vec{c}=\vec{0}$. Evaluate the quantity $\mu=\vec{a}\cdot\vec{b}+\vec{b}\cdot\vec{c}+\vec{c}\cdot\vec{a}$, if $\left|\vec{a}\right|=1,\ \left|\vec{b}\right|=4$ and $\left|\vec{c}\right|=2$.

6. If the vertices $A,\ B$ and C of a triangle are $(1, 2, 3), (-1,\ 0,\ 0)$ and $(0, 1, 2)$ respectively then ind $\underline{|ABC}$.

7. Let $\vec{a},\ \vec{b}$ and $\vec{c}$ be three vectors such that $\left|\vec{a}\right|=3,\ \left|\vec{b}\right|=4,\ \left|\vec{c}\right|=5$ and each one of them being perpendicular to the sum of the other two, find $\left|\vec{a}+\vec{b}+\vec{c}\right|$

8. Show that the vectors $2\hat{i}-\hat{j}+k,\ \hat{i}-3\hat{j}-5k$ and $3\hat{i}-4\hat{j}-4k$ form the vertices of a right angled triangle.

Chapter – 12 3 -D

BRIKS ACADEMY PADMANABHANAGAR CONT: 9900084667

MCQ'S –1; FB – 1; 2 Marks – 1; 5 Marks – 1

MCQ'S:(1........Q.No.13)

1. If α,β,γ are the angles that a line makes with the positive direction of x,y,z axis, respectively, then the direction cosines of the line are:
   (a) $\sin\alpha,\sin\beta,\sin\gamma$ (b) $\cos\alpha,\cos\beta,\cos\gamma$ (c) $\tan\alpha,\tan\beta,\tan\gamma$ (d) $\cos^2\alpha,\cos^2\beta,\cos^2\gamma$

2. A line makes equal angles with co-ordinate axis. Direction cosines of this line are:
   (a) $\pm(1,1,1)$ (b) $\pm\left(\frac{1}{\sqrt{3}},\frac{1}{\sqrt{3}},\frac{1}{\sqrt{3}}\right)$ (c) $\pm\left(\frac{1}{3},\frac{1}{3},\frac{1}{3}\right)$ (d) $\pm\left(\frac{1}{\sqrt{3}},\frac{-1}{\sqrt{3}},\frac{-1}{\sqrt{3}}\right)$

3. The equation of straight line passing through the point (a, b, c) and parallel to z- axis, is:
   (a) $\frac{x-a}{1}=\frac{y-b}{1}=\frac{z-c}{0}$ (b) $\frac{x-a}{0}=\frac{y-b}{1}=\frac{z-c}{1}$
   (c) $\frac{x-a}{1}=\frac{y-b}{0}=\frac{z-c}{0}$ (d) $\frac{x-a}{0}=\frac{y-b}{0}=\frac{z-c}{1}$

4. If a line makes angles $\frac{\pi}{3}$ and $\frac{\pi}{4}$ with the x-axis and y-axis respectively. Then the angle made by the line with z-axis is
   a. $\frac{\pi}{2}$ b. $\frac{\pi}{3}$ c. $\frac{\pi}{4}$ d. $\frac{5\pi}{12}$

5. If a line makes α, β, γ with the positive direction of x, y and z-axis respectively, then $\cos^2\alpha+\cos^2\beta+\cos^2\gamma$ is
   $\frac{1}{2}$ b. - $\frac{1}{2}$ c. -1 d. 1

6. If the direction cosines l, m, n of a line are 0, $\frac{1}{2},\frac{\sqrt{3}}{2}$ then the angle made by the line with the positive direction of y – axis is
   (a) 60^0 (b) 30^0 (d) 90^0 (d) 45^0

FILL IN THE BLANKS (1.........Q.No. 19)

42. If the lines $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z-1}{4}$ and $\frac{x-3}{1}=\frac{y-k}{2}=\frac{z}{1}$ intersect, the value of k is ....
43. A line makes acute angles α,β and γ with the coordinates axes such that cos α . cos β . cos $\gamma=\frac{2}{9}$ and cos γ cos α = $\frac{4}{9}$, then cos α + cos β + cos γ =................
44. If a line makes an angles α,β,γ with the coordinates axes then $\cos 2\alpha+\cos 2\beta+\cos 2\gamma$ is ....
45. If a line makes α, β, γ with the positive direction of x, y and z-axis respectively, then $\cos^2\alpha+\cos^2\beta+\cos^2\gamma$ is ....
46. If lines $\frac{x-1}{-3}=\frac{y-2}{2k}=\frac{z-3}{2}$ and $\frac{x-1}{3k}=\frac{y-1}{1}=\frac{z-6}{-5}$ are perpendicular, the value of k is ....

47. The distance between the parallel lines $\vec{r} = \left(\hat{i} + 2j - 4k\right) + \lambda\left(2\hat{i} + 3j + 6k\right)$ and $\vec{r} = \left(3\hat{i} + 3j - 5k\right) + \mu\left(2\hat{i} + 3j + 6k\right)$ is ………………

48. The lines $\frac{x-5}{k} = \frac{y+2}{-5} = \frac{z}{1}$ *and* $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$ are perpendicular then k = ……………..

2 MARKERS (1…….Q.No. 29)

1. Find the angle between the pair of lines $\vec{r} = \left(3\hat{i} + 2j - 4k\right) + \lambda\left(\hat{i} + 2j + 2k\right)$ and $\vec{r} = 5\hat{i} - 2j + \mu\left(3\hat{i} + 2j + 6k\right)$.

2. Find the distance between the parallel lines $\vec{r} = \left(\hat{i} + 2j - 4k\right) + \lambda\left(2\hat{i} + 3j + 6k\right)$ and $\vec{r} = \left(3\hat{i} + 3j - 5k\right) + \mu\left(2\hat{i} + 3j + 6k\right)$.

3. If the lines $\dfrac{x-1}{-3} = \dfrac{y-2}{2k} = \dfrac{z-3}{2}$ and $\dfrac{x-1}{3k} = \dfrac{y-1}{5} = \dfrac{z-6}{-5}$ are perpendicular. Find K

4. Find the angle between the pair of liens $\dfrac{x+3}{3} = \dfrac{y-1}{5} = \dfrac{z+3}{4}$ and $\dfrac{x+1}{1} = \dfrac{y-4}{1} = \dfrac{z-5}{2}$.

5. Find the angle between the pair of lines $\vec{r} = \left(3\hat{i} + j - 2k\right) + \lambda\left(\hat{i} - j - 2k\right)$ and $\vec{r} = \left(2\hat{i} - j - 56k\right) + \mu\left(3\hat{i} - 5j - 4k\right)$.

6. Find the Cartesian and vector equation of a line which passes through the point $(-2, 4, -5)$ and parallel to the line $\dfrac{x+3}{3} = \dfrac{y-4}{5} = \dfrac{z+8}{6}$.

7. Find the equation of the line which passes through the point $(1, 2, 3)$ and is parallel to the vector $3\hat{i} + 2j - 2k$ both in vector form and Cartesian form.

FIVE MARK QUESTIONS: (1 ………Q.NO. 50)

1. Derive the equation of a line in space passing through a given point and parallel to a vector both in the vector and Cartesian form.

Chapter – 13 L.P.P.

BRIKS ACADEMY PADMANABHANAGAR CONT: 9900084667

MCQ'S –1; 6 Marks – 1

PART – A (MCQ 1...........Q.No. 14)

1. In a LPP, the objective function is always
   (a) cubic function (b) quadratic function (c) linear function (d) constant function

2. Objective function of LPP is
   (a) A function to be optimized
   (b) A constant function
   c. a relation between the variables
   d. none of these

3. The region represent by the inequalities $x \ge 6,\ y \ge 3,\ 2x + y \ge 10,\ x \ge 0,\ y \ge 0$ is
   (a) unbounded b. a polygon c. bounded region d. exterior of a triangle

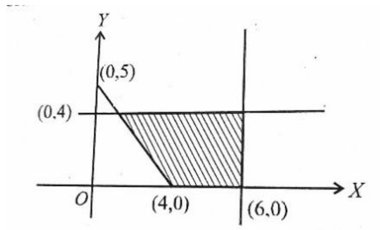
4. If a LPP admits optimal solution at two consecutive vertices of the feasible region, then
   a. The required optimal solution is at the midpoint of line joining these two points
   b. The optimal solution occurs at very point on the line joining these two point
   c. The LPP under consideration is not solvable
   d. The LPP under consideration must be reconstructed

5. The feasible region of an LPP is always
   (a) a close set b. an unbounded set c. a bounded set d. a convex set

6. The minimum value of linear objective function x = 5x + 2y subjected to $10x + 2y \ge 20,\ 5x + 5y \ge 30,\ x \ge 0,\ y \ge 0$, is
   (a) 10 b. 15 c. 20 d. 25

7. The shaded region in the following figures is the solution set of the inequations,

   a. $5x + 4y \ge 20,\ x \le 6,\ y \ge 4,\ x \ge 0,\ y \ge 0$
   b. $5x + 4y \ge 20,\ x \le 6,\ y \le 4,\ x \ge 0,\ y \ge 0$
   c. $5x + 4y \le 20,\ x \le 6,\ y \le 4,\ x \ge 0,\ y \ge 0$
   d. $5x + 4y \ge 20,\ x \ge 6,\ y \le 4,\ x \ge 0,\ y \ge 0$



8. Optimization of the objective function is a process of

a. maximizing the objective function
b. minimizing the objective function
c. maximizing or minimizing the objective function
d. none of these

PART -E (6 marks – 1............Q.No.51)

1. Maximize $Z=5x+3y$

   Subjected to constraints: $3x+5y\le 15, 5x+2y\le 10, x\ge 0, y\ge 0$.

2. Maximize $Z=3x+2y$

   Subjected to constraints: $x+2y\le 10, 3x+y\le 15, x, y\ge 0$.

3. Maximize $Z=4x+y$

   Subjected to constraints: $x+y\le 50, 3x+y\le 90, x\ge 0, y\ge 0$.

4. Minimize $Z=-3x+4y$

   Subjected to constraints: $x+2y\le 8, 3x+2y\le 12, x\ge 0, y\ge 0$.

5. Minimize $Z=200x+500y$

   Subjected to constraints: $x+2y\ge 10, 3x+4y\le 24, x\ge 0, y\ge 0$.

6. Minimize and Maximize $Z=5x+10y$

   Subjected to constraints: $x+2y\le 120, x+y\ge 60, x-2y\ge 0, x, y\ge 0$.

7. Minimize and Maximize $Z=x+2y$

   Subjected to constraints: $x+2y\ge 100, 2x-y\le 0, 2x+y\le 200, x, y\ge 0$.

8. Minimize and Maximize $Z=3x+9y$

   Subjected to constraints: $x+3y\le 60, x+y\ge 10, x\le y, x\ge 0, y\ge 0$.

Chapter – 14 PROBABALITY

BRIKS ACADEMY PADMANABHANAGAR CONT: 9900084667

MCQ'S –1; FB – 1; 2 Marks – 2; 3 Marks – 1

MCQ'S: (1............Q.No. 15)

1. If $P(A)=\frac{1}{2}$, $P(B)=0$, then $P(A/B)$ is :

   (a) 0 (b) $\frac{1}{2}$ (c) not defined (d) 1

2. If A and B are two events such that $A \subset B$ and $P(B) \neq 0$, then which of the following is correct?

   (a) $P(A/B)=\frac{P(A)}{P(B)}$ (b) $P(A/B)<P(A)$

   (c) $P(A/B) \geq P(A)$ (d) None

3. The probability of obtaining an even prime number on each die, when a pair of dice is rolled is

   (a) 0 (b) $1/3$ (c) $1/12$ (d) $1/36$

4. Two events A and B will be independent, if

   (a) A and B are mutually exclusive

   (b) P(A′B′) = [1 – P(A)] [1 – P(B)]

   (c) P(A) = P(B)

   (d) P(A) + P(B) = 1

5. Probability that A speaks truth is 4/5 . A coin is tossed. A reports that a head appears. The probability that actually there was head is

   (a) 4/5 (b) 1/2 (c) 1/5 (d) 2/5

6. If A and B are two events such that A ⊂ B and P(B) ≠ 0, then which of the following is correct?

   (a) $P(A|B)=\frac{P(A)}{P(B)}$ (b) $P(A|B)<P(A)$ (c) $P(A|B)>P(A)$ (d) NONE

7. If A and B are two events and $A \neq \Phi, B \neq \Phi$, then

   (a) $P(A/B)=P(A).P(B)$ (b) $P(A/B)=\frac{P(A \cap B)}{P(B)}$

   (c) $P(A/B).P(B/A)=1$ (d) $P(A/B)=P(A)/P(B)$

8. If A and B are two events such that P(A) ≠ 0 and P(B | A) = 1, then

   (a) A ⊂ B (b) B ⊂ A (c) B = ϕ (d) A = ϕ

9. If P(A|B) > P(A), then which of the following is correct :

   (a) P(B|A) < P(B) (b) P(A ∩ B) < P(A) . P(B) (c) P(B|A) > P(B) (d) P(B|A) = P(B)

10. If A and B are any two events such that P(A) + P(B) – P(A and B) = P(A), then

(a) P(B|A) = 1 (b) P(A|B) = 1 (c) P(B|A) = 0 (d) P(A|B) = 0

11. If $P(A/B) > P(A)$, then which of the following is correct :

(a) $P(B/A) < P(B)$ (b) $P(A \cap B) < P(A).P(B)$

(c) $P(B/A) > P(B)$ (d) $P(B/A) = P(B)$

12. If A and B are events such that $P(A/B) = P(B/A)$, then

(a) $A \subset B$ but $A \neq B$ (b) $A = B$ (c) $A \cap B = \Phi$ (d) $P(A) = P(B)$

13. If A and B are any two events such that $P(A) + P(B) - P(A \text{ and } B) = P(A)$, then

(a) $P(B/A) = 1$ (b) $P(A/B) = 1$ (c) $P(B/A) = 0$ (d) $P(A/B) = 0$

14. If A and B are events such that $P(A) > 0$ and $P(B) \neq 1$, then $P(A'/B')$ equals.

(a) $1 - P(A/B)$ (b) $1 - P(A'/B)$ (c) $\frac{1 - P(A \cup B)}{P(B')}$ (d) $P(A')/P(B')$

15. Let A and B be two events such that $P(A) = 0.6, P(B) = 0.2$ and $P(A/B) = 0.5$. Then $P(A'/B')$ equals

(a) $\frac{1}{10}$ (b) $\frac{3}{10}$ (c) $\frac{3}{8}$ (d) $\frac{6}{7}$

16. If $P(A) = 0.4, P(B) = 0.8$ and $P(B/A) = 0.6$, then $P(A \cup B)$ is equals to

(a) 0.24 (b) 0.3 (c) 0.48 (d) 0.96

17. If $P(A) = \frac{3}{10}, P(B) = \frac{2}{5}$ and $P(A \cup B) = \frac{3}{5}$, then $P(B/A) + P(A/B)$ equals

(a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) $\frac{5}{12}$ (c) $\frac{7}{12}$

18. If A and B are two events such that $P(A) = \frac{1}{2}, P(B) = \frac{1}{3}, P(A/B) = \frac{1}{4}$, then $P(A' \cap B')$ equals

(a) $\frac{1}{12}$ (b) $\frac{3}{4}$ (c) $\frac{1}{4}$ (d) $\frac{3}{16}$

19. A and B are events such that $P(A) = 0.4, P(B) = 0.3$ and $P(A \cup B) = 0.5$, then $P(B' \cap A) =$

(a) $\frac{2}{3}$ (b) $\frac{1}{2}$ (c) $\frac{3}{10}$ (d) $\frac{1}{5}$

20. You are given that A and B are two events such that $P(B) = \frac{3}{5}, P(A/B) = \frac{1}{2}$ and $P(A \cup B) = \frac{4}{5}$, then $P(B/A')$ is equal to

(a) $\frac{1}{5}$ (b) $\frac{3}{10}$ (c) $\frac{1}{2}$ (d) $\frac{3}{5}$

21. If $P(B)=\frac{3}{5}, P(A/B)=\frac{1}{2}$ and $P(A\cup B)=\frac{4}{5}$, then $P(A\cup B)'+P(A'\cup B)=$

(a) $\frac{1}{5}$ (b) $\frac{4}{5}$ (c) $\frac{1}{2}$ (d) 1

22. Let A and B are two events such that $P(A)=\frac{3}{8}, P(B)=\frac{5}{8}$ and $P(A\cup B)=\frac{3}{4}$. Then $P(A/B).P(A'/B)$ is equal to

(a) $\frac{2}{5}$ (b) $\frac{3}{8}$ (c) $\frac{3}{20}$ (d) $\frac{6}{25}$

23. A box containing 3 orange balls, 3 green balls and 2 blue balls. Three balls are drawn at random from the box without replacement. The probability of drawing 2 green balls and one blue ball is

(a) $\frac{3}{28}$ (b) $\frac{2}{21}$ (c) $\frac{1}{28}$ (d) $\frac{167}{168}$

24. If $P(A\cap B)=\frac{7}{10}$ and $P(B)=\frac{17}{20}$, where P stands for probability, then $P(A/B)$ is equal to **[KCET 2016]**

(a) $\frac{14}{17}$ (b) $\frac{17}{20}$ (c) $\frac{7}{8}$ (d) $\frac{1}{8}$

25. In a college, 30 students fail in physics, 25 fail in mathematics and 10 fail in both. One student is chosen at random. The probability that she fails in physics is she has failed in mathematics is

(a) $\frac{1}{10}$ (b) $\frac{2}{5}$ (c) $\frac{9}{20}$ (d) $\frac{1}{3}$

26. 10% of the bulbs produced in a factory are of red colour and 2% are red and defective. If one bulb is picked up at random, then the probability of its being defective if it is red is

(a) $\frac{1}{2}$ (b) $\frac{1}{10}$ (c) $\frac{1}{5}$ (d) $\frac{1}{12}$

27. If A and B are two events of a sample space S such that $P(A)=0.2$, $P(B)=0.6$ and $P(A/B)=0.5$, then $P(A'/B)=$

(a) $\frac{1}{2}$ (b) $\frac{3}{10}$ (c) $\frac{1}{3}$ (d) $\frac{2}{3}$

28. Two events A and B will be independent, if

(a) A and B are mutually exclusive (b) $P(A'B')=[1-P(A)][1-P(B)]$

(c) $P(A)=P(B)$ (d) $P(A)+P(B)=1$

29. If A and B are independent events such that $0<P(A)<1$ and $0<P(B)<1$, then which of the following is not correct?

(a) A and B are mutually exclusive (b) A and B' are independent

(c) A' and B are independent (d) A' and B' are independent

30. If A and B' are independent events, then $P(A' \cup B) = 1 -$ ________

(a) $P(A).P(B')$ (b) $P(A').P(B)$ (c) $P(A').P(B')$ (d) $P(A).P(B)$

31. If 2 events are independent, then

(a) they must be mutually exclusive (b) the sum of their probabilities = 1

(c) (a) & (b) both are correct (d) None of the above is correct

32. Three events A, B and C are said to be independent if

(a) $P(A \cap B \cap C) = P(A).P(B).P(C)$ (b) A, B and C are pairwise independent

(c) $P(A \cup B \cup C) = P(A) + P(B) + P(C)$ (d) $P(A \cup B \cup C) = 1$

FB(1..........Q.No. 20)

1. If $P(A) = \frac{4}{5}$ and $P\left(B/A\right) = \frac{2}{5}$, then $P(A \cap B)$ is equal to ....

2. If $P(A) = 0.6$, $P(B) = 0.3$ and $P(A \cap B) = 0.2$, then $P\left(A/B\right)$..................

3. If $P(A) = \frac{3}{5}$, $P(B) = \frac{1}{5}$, $P(A \cap B)$ if A and B are independent events then $P(A \cap B) =$......

4. If $P(A) = 0.8$, $P(B) = 0.5$ and $P\left(B/A\right) = 0.4$ then $P(A \cap B)$ is equal to ....

5. If A and B are independent events with $P(A) = 0.3$ and $P(B) = 0.4$, then $P(A \cap B) =$ ....

6. If $P(E) = 0.6$ and $P(E \cap F) = 0.2$ then $P\left(F/E\right)$ is equal to ....

7. A fair die is rolled. Consider the events $E = \{1, 3, 5\}$ and $F = \{2, 3\}$, then $P\left(E/F\right) =$.............

8. If E is an event of a sample space S of an experiment then then $P\left(S/F\right) =$ ....

9. If $P(A) = \frac{7}{13}$, $P(B) = \frac{9}{13}$ and $P(A \cap B) = \frac{4}{13}$, then $P\left(A/B\right)$ is equal to ....

10. If $P(A) = 0.3$ and $P(B) = 0.4$, , if A and B are independent events then $P\left(A/B\right) =$ ......

11. If F is an event of a sample space S of a random experiment, then find $P\left(F/F\right)$.

12. If $P(A) = \frac{1}{2}$, $P(B) = 0$, then is equal to ....

13. A and B are two events such that $P(A) \neq 0$. if A is a subset of B then $P\left(B/A\right)$, =............

14. A and B are two events such that $P(A) \neq 0$. if $A \cap B = \phi$ then Find $P\left(B/A\right)$, =............

2 MARKERS (2.............Q.No. 30, 31)

1. A die is thrown. If E is the event 'the number appearing is a multiple of 3' and F be the event 'the number appearing is even', then prove that E and F are independent events.

2. Two coins are tossed once, find $P\left(E/F\right)$ where E: no tail appears, F: no head appears.

3. Given that the events A and B are such that $P(A) = \frac{1}{2}$, $P(A \cap B) = \frac{3}{5}$ and $P(B) = k$, find $'k'$ if A and B are independent.

4. Assume that each born child is equally likely to be a boy or girl. If a family has two children. What is the conditional probability of both are girls given that atleast one is girl?

5. A fair die is rolled. Consider the events $E = \{1, 3, 5\}$, $F = \{2, 3\}$ and $G = \{2, 3, 4, 5\}$. Find (i) $P\left(E/F\right)$ (ii) $P\left(E/G\right)$.

6. Given two independent events A and B such that $P(A) = 0.3$, $P(B) = 0.6$.
   Find
   (i) $P(A \text{ and not } B)$
   (ii) $P(\text{neither } A \text{ or } B)$.

7. Mother, father and son line up at random for a family picture, if E "son on one end" and E "father in middle", find $P\left(E/F\right)$.

8. A family has two children. What is the probability that both the children are boys given that at least one of them is a boy?

9. If $P(E_1) = \frac{1}{2}$, $P(E_2) = \frac{1}{2}$ and $P\left(A/E_1\right) = \frac{1}{2}$, $P\left(A/E_2\right) = \frac{1}{4}$. Find $P\left(E_1/A\right)$.

10. A coin is tossed three times, where E: atmost two tails, F: at least one tail. Determine $P\left(E/F\right)$.

11. An urn contains 10 black and 5 white balls. Two balls are drawn from the urn one after the other without replacement. What is the probability that both drawn balls are black?

12. A die marked 1, 2, 3 in red and 4, 5, 6 in green is tossed. Let A be the event, 'the number is even', and B be the event, 'the number is red'. Are A and B independent?

13. Probability of solving specific problem independently by A and B are $\frac{1}{2}$ and $\frac{1}{3}$ respectively. If both try to solve the problem independently, find the probability that the problem is solved.

THREE MARK QUESTIONS : (1...........Q.NO. 42)

1. Bag-I contains 3 red and 4 black balls while another Bag-II contains 5 red and 6 black balls. One ball is drawn at random from one of the bag and it is found to be red. Find the probability that it was drawn from Bag-II.

2. An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probability of accidents is 0.01, 0.03 and 0.15 respectively. One of the insured person meets with an accident. What is the probability that he is a scooter driver?

3. Two groups are competing for the position on the board of directors of a corporation. The probability of I and II groups will win are 0.6 and 0.4 respectively. Further, if I group wins, the probability of introducing a new product is 0.7 and corresponding probability is 0.3 if the II group wins. Find the probability that new product introduced was by the II group.

4. Given three identical boxes I, II and III each containing two coins. In box I, both coins are gold coins, in box II, both are silver coins and in the box III, there is one gold and one silver coin. A person chooses a box at random and takes out a coin. If the coin is gold, what is the probability that the other coin in the box is also gold?

5. A man is known to speak truth 3 out of 4 times. He throws a die and reports that it is a six. Find the probability that it is actually a six.

6. There are three coins, one is a two headed coin, another is a biased coin that comes up head 75% of the time and third is an unbiased coin. One of the three coins is choose at random and tossed it shows head. What is the probability that it was the two headed coin.

7. A person has undertaken a construction job. The probabilities are 0.65 that there will be strike, 0.80 that the construction job will be completed on time if there is no strike, and 0.32 that the construction job will be completed on time if there is a strike. Determine the probability that the construction job will be completed on time.