MATHS

BOOKS - VGS PUBLICATION-BRILLIANT

MOST IMPORTANT QUESTIONS

Complex Numbers Very Short Answer Type Questions

1. Find the complex conjugate of $(3+4i)(2-3i)$

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2. If $z=(\cos\theta,\sin\theta)$, find $\left(z-\frac{1}{z}\right)$

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3. Find the multiplicative of $7 + 4i$.

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4. Find the square root of 7 + 24i.

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5. If $z = 2 - 3i$, then show that $z^2 - 4z + 13 = 0$

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6. If $(a + ib)^2 = x + iy$ find $x^2 + y^2$

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7. If $x + iy = cis\alpha . cis\beta$, then find the valeu of $x^2 + y^2$.

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8. Express the complex number in modulus amplitudes form $1 + I\sqrt{3}$

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9. Represent the complex number $z = 1 + i\sqrt{3}$ in the polar form.

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10. If $z_1 = -1$ and $z_2 = -i$, then find Arg $(z_1 z_2)$

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11. If $z_1 = -1, z_2 = i,$ then find $Arg\left(\frac{z_1}{z_2}\right)$.

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12. If the Arg $\bar{z}_1$ and $Argz_2$ are $\frac{\pi}{5}$ and $\frac{\pi}{3}$ respectively,find (Arg ($z_1 + Argz_2$)

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13. If $\left(\sqrt{3}i\right)^{100} = 2^{99}(a + ib)$. Then shot that $a^2 + b^2 = 4$

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14. If the amplitdue of $(z - 1)$ is $\frac{\pi}{2}$, then find the locus of z.

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Complex Numbers Short Answer Type Questions

1. If $(x - iy)^{1/3} = a - ib$, then show that $\frac{x}{a} + \frac{y}{b} = 4\left(a^2 - b^2\right)$.

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2. If the real part of $\frac{z+1}{z+i}$ is 1, then find the locus of z.

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3. Determine the locus of z, $z \neq 21i$ such that Re $\left(\frac{z-4}{z-2i}\right) = 0$

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4. If z = x +iy and if the point P in the argand plane represents z then find the locus of P satisfying the equation

$\frac{z-i}{z-1}$ is purely imaginary

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5. Show that the points in the Argand digraam represented by the complex numbers $2+2i, \ -2-2i, 2\sqrt{3}+2\sqrt{3}i$ are the vertices of an

equilateral triangle.

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6. Show that the points in the Argand plnae, represented by the complex numbers $2 + i4 + 3i, 2 + 5i, 3i$ are the vertices of a square.

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7. Show that the points in the Argand plane represented by the complex numbers $-2 + 7i, -\frac{3}{2} + \frac{1}{2} + i4 - 3i\frac{7}{2}(1 + i)$ are the vertices of a rhombus.

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De Moivre S Theorem Very Short Answer Type Questions

1. If $x = cis\theta$, then find the value of $\left[x^6 + \frac{1}{x^6}\right]$.

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2. If A, B, C are angles of a triangle such that $x = cisA, y = cisB, z = cisC$, then find the value of xyz.

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3. Find the values of $(1 - i)^8$

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4. Find the value of $\left(1 + i\sqrt{3}\right)^3$

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5. $(2 - \omega)\left(2 - \omega^2\right)\left(2 - \omega^{10}\right)\left(2 - \omega^{11}\right) = 49.$

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6. If $1, \omega + \omega^2$ are the cube roots of unity prove that

(i) $\left(1 - \omega + \omega^2\right)^6 + \left(1 - \omega^2 + \omega\right)^6 = 128$

$= \left(1 - \omega + \omega^2\right)^7 + \left(1 + \omega - \omega^2\right)^7$

(ii) $(a + b)\left(a\omega + b\omega^2\right)\left(a\omega^2 + b\omega\right) = a^3 + b^3$

(iii) $x^2 + 4x + 7 = 0$ where $x = \omega - \omega^2 - 2.$

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7. If $1, \omega, \omega^2$ are the cube roots of unity , then w^2=

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De Moivre S Theorem Long Answer Type Questions

1. If n is integer then show that

$(1 + i)^{2n} + (1 - i)^{2n} = 2^{n+1} \cos. \frac{n\pi}{2}.$

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2. If n is a positive integer, show that

$(1+i)^n + (1-i)^n = 2^{\frac{n+2}{2}} \cos\left(\frac{n\pi}{4}\right)$.

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3. If n is an integer then show that

$(1+\cos\theta + i\sin\theta)^n + (1+\cos\theta - i\sin\theta)^n = 2^{n+1}\cos^n(\theta/2)\cos\left(\frac{n\theta}{2}\right)$

.

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4. If α, β are the roots of the equation $x^2 - 2x + 4 = 0$ then for any $n \in N$ show that $\alpha^n + \beta^n = 2^{n+1}\cos\left(\frac{n\pi}{3}\right)$.

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5. If $\cos\alpha + \cos\beta + \cos\gamma = 0$

$= \sin\alpha + \sin\beta + \sin\gamma$ then show that

$\cos 3\alpha + \cos 3\beta + \cos 3\gamma = 3\cos(\alpha + \beta + \gamma)$

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6. If $\cos\alpha + \cos\beta + \cos\gamma = 0$

$= \sin\alpha + \sin\beta + \sin\gamma$ then show that

$\sin 3\alpha + \sin 3\beta + \sin 3\gamma = 3\sin(\alpha + \beta + \gamma)$

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7. If $\cos\alpha + \cos\beta + \cos\gamma = 0 \sin\alpha + \sin\beta + \sin\gamma$, Prove that

$\cos^2\alpha + \cos^2\beta + \cos^2\gamma = \frac{3}{2} = \sin^2\alpha + \sin^2\beta + \sin^2\gamma.$

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8. If n is a positive integer, show that

$$(P+iQ)^{1/n}+(P-iQ)^{1/n}=2\left(P^2+Q^2\right)^{1/2n}\cos\left(\frac{1}{n},\tan.\frac{Q}{P}\right).$$

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9. Show that one value of

$$\left(\frac{1+\sin.\frac{\pi}{8}+i\cos.\frac{\pi}{8}}{1+\sin.\frac{\pi}{8}-i\cos.\frac{\pi}{8}}\right)^{8/3} \quad \text{is} \quad -1.$$

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10. Solve the following equations.

$$x^9-x^5+x^4-1=0$$

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Quadratic Equations Very Short Answer Type Questions

1. Form quadratic equation whose root $7 \pm 2\sqrt{5}$

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2. If α, β are the roots of the equation $ax^2 + bx + c = 0$, find the value $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ expressions in terms of a,b,c.

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3. If α, β are the root sof the equation $ax^2 + bx + c = 0,$ then find the value of $\frac{\alpha^2 + \beta^2}{\alpha^{-2} + \beta^{-2}}$.

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4. Prove that the roots of $(x - a)(x - b) = h^2$ are always real.

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5. If the equation $x^2 - 15 - m(2x - 8) = 0$ has equal roots, find the value of 'm'.

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6. For what values of x, the expression $2x - 7 - 5x^2$ is maximum and also find the maximum value.

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7. For what value of x, the following expressions are positive ?

$x^2 - 5x + 6$

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8. If $x^2 - 6x + 5 = 0$ and $x^2 - 12x + p = 0$ have a common root, then find p.

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Quadratic Equations Short Answer Type Questions

1. If x is real, prove that $\frac{x}{x^2 - 5x + 9}$ lies between 1 and $\frac{-1}{11}$.

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2. Prove that $\frac{1}{3x + 1} + \frac{1}{x + 1} - \frac{1}{(3x + 1)(x + 1)}$ does not lie between 1 and 4, if x is real.

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3. Show that none of the values of the function $\frac{x^2 + 34x - 71}{x^2 + 2x - 7}$ over R lies between 5 and 9.

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4. Determine the range of the $\frac{x^2+x+1}{x^2-x+1}$ expressions.

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5. Find the range of $\frac{x+2}{2x^2+3x+6}$

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6. Find the maximum value of the function

$\frac{x^2+14x+9}{x^2+2x+3}$ over R.

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7. If the expressions $\frac{x-p}{x^2-3x+2}$ takes all real value for $x \in R$, then find the bounts for p.

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Theory Of Equations Very Short Answer Type Questions

1. If $1, 1, \alpha$ are the roots of $x^3 - 6x^2 + 9x - 4 = 0$ then find $'\alpha'$.

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2. If the product of the roots of

$4x^3 + 16x^2 - 9x - a = 0$ is 9 , then find a .

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3. If -1, 2 ,α are roots of $2x^3 + x^2 - 7x - 6 = 0$ then α =

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4. If $\alpha, \beta, 1$ are the roots of $x^3 - 2x^2 - 7x + 6 = 0,$ then find $\alpha, \beta.$

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5. Find the polynomial equation whose roots are $2 \pm \sqrt{3}, 1 \pm 2i$.

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6. If 1,2,3 and 4 are the roots of $x^4 + ax^3 + bx^2 + cx + d = 0$, then find the values of a,b,c and d.

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7. Find the equation whose roots are

3 times the roots of $x^3 + 2x^2 - 4x + 1 = 0$

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8. Find the polynomial equation whose roots are the reciprocals of the roots of $x^4 - 3x^3 + 7x^2 + 5x - 2 = 0$

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9. Form the polynomial equation whose roots are the squares of the roots of $x^3 + 3x^2 - 7x + 6 = 0$

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Theory Of Equations Long Answer Type Questions

1. Solve the equation $8x^3 - 36x^2 - 18x + 81 = 0$ the roots being in A.P.

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2. Solve the $3x^3 - 26x^2 + 52x - 24 = 0$ equations , given that the roots of each are in G.P.

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3. Solve $x^4 + x^3 - 16x^2 - 4x + 48 = 0$ given that the product of two of the roots is 6.

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4. Solve $18x^3 + 81x^2 + 121x + 60 = 0$ given that one roots is equal to half the sum of the remainging roots .

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5. Solve $x^4 - 4x^2 + 8x + 35 = 0$,given that $2 + i\sqrt{3}$ is a root.

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6. Find the polynomial equation whose roots are the translates of the roots of the equation . $x^4 - x^3 - 10x^2 + 4x + 24 = 0$ by 2 .

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7. Find the polynomial equation whose roots are translate of the root of $x^5 + 4x^3 - x^2 + 11 = 0by - 3.$

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8. The roots of $2x^5 + x^4 - 12x^3 - 12x^2 + x + 2 = 0$ are

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9. Solve $x^5 - 5x^4 + 9x^3 - 9x^2 + 5x - 1 = 0.$

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10. Solve $x^5 - 5x^4 + 9x^3 - 9x^2 + 5x - 1 = 0.$

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11. Solve the following equations . $x^4 - 10x^3 + 26x^2 - 10x + 1 = 0$

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12. Solve the equation $6x^6 - 25x^5 + 31x^4 - 31x^2 + 25x - 6 = 0$

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Premutations Combinations Very Short Answer Type Questions

1. If ${}^nP_3 = 1320$, find n.

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2. If ${}^{12}P_r = 1320$, find r.

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3. If ${}^nP_7 = 42.\ {}^nP_5$. find n.

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4. Find the the number of functions from a set A containing 5 elements into a set B containing 4 elements.

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5. Find the number of bijections from a set A containing 7 elements onto itself.

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6. Find the number of different chains that can be prepared using 7 different coloured beads.

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7. Find the number of ways of arranging the letters of the word.

INDEPENDENCE

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8. Find the number of ways of arranging the letters of the word.

MATHEMATICS

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9. Find the number of ways of arranging the letters of the word.

INTERMEDIATE

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10. Find the number of ways of arranging all the letters of the word

ENGINEERING

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11. Find the number of ways of arranging the letters of the word.

PERMUTATION

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12. Find the number of ways of arranging the letters of the word.

COMBINATION

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13. If ${}^{n}C_{4} = 210$ then find n.

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14. If ${}^{n}P_{r} = 5040$ and ${}^{n}C_{r} = 210$, find n and r.

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15. If ${}^{12}C_{(s+1)} = {}^{12}C_{(2s-5)}$, then find s.

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16. If ${}^{12}C_{(s+1)} = {}^{12}C_{(2s-5)}$, then find s.

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17. If ${}^{n}C_{21} = {}^{n}C_{27}$ find ${}^{49}C_{n}$

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18. If ${}^{n}C_{5} = (n)C_{6}$, then find 13_{Cn}.

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19. If ${}^{9}C_{3} + {}^{9}C_{5} = {}^{10}C_{r}$ then find r.

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20. Find the value of ${}^{10}C_{5} + 2.\ {}^{10}C_{4} + {}^{10}C_{3}$.

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21. Find the number of ways of selecting 4 boys and 3 girls from a group of 8 boys and 5 girls.

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22. Find the number of diagonals of a polygon with 12 sides.

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23. Find the number of positive divisors of 1080

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Premutations Combinations Short Answer Type Questions

1. Find the rank of the word

MASTER

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2. Find the rank of the word

REMAST

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3. If the letters of the word PRISON are permuted in all possible ways and the words thus formed are arranged in dictionary order, find the rank of the word. PRISON

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4. Find the rank of

EAMCET

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5. Find the rank of the word

AJANTA

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6. A group of students decided to collect as many paise from each member of group as is the number of members. If the total collection amounts to Rs. 59.29, the number of the member is the group is:

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7. Find the sum of all 4- digited numbers that can be formed using the digits 1,3,5,7,9.

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8. Find the sum of all 4 digited numbers that can be formed using the digits 0,2,4,7,8 without repetition.

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9. Find the number of ways of arranging 5 boys and 4 girls in a line so that the line begins and ends with a boy.

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10. Simplify ${}^{34}C_5 + \sum_{r=0}^{4} {}^{(38-r)}C_4$.

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11. Prove that

$${}^{25}C_4 + \sum_{r=0}^{4} {}^{(29-r)}C_3 = {}^{30}C_4$$

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12. Prove that $\frac{{}^{4n}C_{2n}}{{}^{2n}C_n} = \frac{1.3,5.....(4n-1)}{\{1.3.5....(2n-1)\}^2}$

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13. Find the number of ways of selecting 11 member cricket team from 7 bats men, 6 bowlers and 2 wicket keepers so that the team contains 2 wicket keepers and atleast 4 bowlers.

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14. Find the number of ways of selecting a cricket team of 11 players from 7 batsmen and 6 bowlers such that there will be atleast 5 bowlers in the team.

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15. Find the number of ways of forming a committee of 5 members out of 6 Indians and 5 Americans so that always the Indians will be in majority in the committee.

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Binomial Theorem Very Short Answer Type Questions

1. Find the number of terms in the expansion of $(2x + 3y + z)^7$

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2. Find the middle term (s) in the expansion of $\left(\frac{3x}{7} - 2y\right)^{10}$

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3. Find the tem independent of x is the expansion of $\left(\sqrt{\frac{x}{3}} + \frac{\sqrt{3}}{2x^2}\right)^{10}$.

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4. If ${}^{22}C_r$ is the largest binomial coefficient in the expansion of $(1 + x)^{22}$, find the value of ${}^{13}C_r$.

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5. Prove that $C_0 + 2.\ C_1 + 2^2.\ C_2 + \ldots\ldots + 2^n.\ C_n = 3^n$.

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6. In the first 10 overs of a cricket game, the run rate was only 3.2. What should be the run rate in the remaining 40 overs to reach the target of 282 runs?

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7. Expand $3\sqrt{3}$ in increasing powers of $\frac{2}{3}$.

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Binomial Theorem Long Answer Type Questions

1. If the $2^{\text{nd}}, 3^{\text{rd}}$ and 4^{th} terms in the expansion of $(a+x)^n$ are respectively 240, 720, 1080, find a, x, n.

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2. If 36, 84, 126 are three successive binomial coefficients in the expansion of $(1+x)^n$, find n.

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3. If the coefficients of 4 consecutive terms in the expansion of $(1+x)^n$ are a_1, a_2, a_3, a_4 respectively, then show that

$$\frac{a_1}{a_1+a_2}+\frac{a_3}{a_3+a_4}=\frac{2a_2}{a_2+a_3}$$

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4. If the coefficients of $r^{\text{th}}, (r+1)^{\text{th}}$ and $(r+2)^{\text{nd}}$ terms in the expansion of $(1+x)^n$ are in A.P. then show that $n^2-(4r+1)n+4r^2-2=0.$

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5. Prove that : If n is a positive integer and x is any nonzero real number, then prove that

$$C_0+C_1\frac{x}{2}+C_2.\frac{x^2}{3}+C_3.\frac{x^3}{4}+\ldots.+C_n.\frac{x^n}{n+1}=\frac{(1+x)^{n+1}-1}{(n+1)x}$$

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6. If P and Q are the sum of odd terms and the sum of even terms respectively in the expansion of $(x+a)^n$ then prove that

$$P^2-Q^2=\left(x^2-a^2\right)^n$$

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7. If P and Q are the sum of odd terms and the sum of even terms respectively in the expansion of $(x+a)^n$ then prove that

$4PQ = (x+a)^{2n} - (x-a)^{2n}$

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8. Prove that : For n = 0, 1, 2, 3, ..., n, prove that

$C_0 . C_r + C_1 . C_{r+1} + C_2 . C_{r+2} + ... + C_{n-r} . C_n$

$= {}^{2n}C_{(n+r)}$ and hence deduce that

Prove that : $C_0^2 + C_1^2 + C_2^2 + ... + C_n^2 = {}^{2n}C_n$

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9. Prove that $C_0 + 2 . C_1 + 2^2 . C_2 + ... + 2^n . C_n = 3^n$.

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10. Find the sum of the infinite series

$$1+\frac{1}{3}+\frac{1.3}{3.6}+\frac{1.3.5}{3.6.9}+\ldots\ldots$$

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11. If $x=\frac{1}{5}+\frac{1.3}{5.10}+\frac{1.3.5}{5.10.15}+\ldots\ldots\infty$ then find $3x^2+6x$.

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12. Find the sum of the infinite series

$$\frac{7}{5}\left(1+\frac{1}{10^2}+\frac{1.3}{1.2}.\frac{1}{10^4}+\frac{1.3.5}{1.2.3}.\frac{1}{10^6}+\ldots.\right)$$

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13. Prove that : Find the sum of the series

$$\frac{3.5}{5.10}+\frac{3.5.7}{5.10.15}+\frac{3.5.7.9}{5.10.15.20}+\ldots.\infty$$

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14. If $x = \frac{1.3}{3.6} + \frac{1.3.5}{3.6.9} + \frac{1.3.5.7}{3.6.9.12} + \ldots.$ then prove that $9x^2 + 24x = 11.$

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15. If $x = \frac{5}{(2!).3} + \frac{5.7}{(3!).3^2} + \frac{5.7.9}{(4!).3^3} + \ldots.$

then find the value of $x^2 + 4x.$

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Partial Fractions Short Answer Type Questions

1. Resolve $\frac{x+4}{(x^2-4)(x+1)}$ into partial fraction

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2. Resolve the following into partial fractions.

$$\frac{3x+7}{x^2-3x+2}$$

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3. $3+33+333+3.33=\ ?$

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4. If 20% of a = b, then b% of 20 is the same as:

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5. Resolve $\frac{3x^3-8x^2+10}{(x-1)^4}$ into partial fractions.

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6. Resolve $\frac{x^2+5x+7}{(x-3)^3}$ into partial fractions.

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7. Resolve $\frac{2x^2+3x+4}{(x-1)(x^2+1)}$ into partial fraction.

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8. Resolve $\frac{x^2-3}{(x+2)(x^2+1)}$ into partial fractions.

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9. In an election between two candidates, one got 55% of the total valid votes, 20% of the votes were invalid. If the total number of votes was 7500, the number of valid votes that the other candidate got, was:

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10. $((x-1)(x-2))$ solve by using the quadratic formula .

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11. Find the coefficient of x^n in the power series expansion of $\frac{x-4}{x^2-5x+6}$ specifying the region in which the expansion is valid.

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12. Find the coefficient of x^n in the power series expansion of $\frac{x}{(x-1)^2(x-2)}$ specifying the region in which the expansion is valid.

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Measures Of Dispersion Very Short Answer Type Questions

1. Find the mean deviation about the mean for the following data

3,6,10,4,9,10

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2. Find the mean deviation about the median for the data : 6, 7, 10, 12, 13, 4, 12, 16.

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3. Find the mean deviation about the median for the following data: 13, 17, 16, 11, 13, 10, 16, 11, 18, 12, 17.

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4. Find the mean deviation about the median for the data : 6, 7, 10, 12, 13, 4, 12, 16.

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5. Find the mean deviation about the median for the following data

4,6,9,3,10,13,2

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6. Find the range of the given data : 38, 70, 48, 40, 42, 55, 63, 46, 54, 44.

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7. Find the Variance and Standard deviation for the discrete data given below: 6, 7, 10, 12, 13,4,8, 12.

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Measures Of Dispersion Long Answer Type Questions

1. The mean deviation about the mean for the data is

Marks obtained	0-10	10-20	20-30	30-40	40-50
Number of students	5	8	15	16	6

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2. In a regular week, there are 5 working days and for each day, the working hours are 8. A man gets Rs. 2.40 per hour for regular work and Rs. 3.20 per hours for overtime. If he earns Rs. 432 in 4 weeks, then how many hours does he work for ?

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3. 8796 x 223 + 8796 x 77 = ?

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4. Find the mean deviation from the median for the following data:

x_i	6	9	3	12	15	13	21	22
f_i	4	5	3	2	5	4	4	3

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5. Calculate the variance and Standard deviation of the following distribution with mean is 62:

Class	30–40	40–50	50–60	60–70	70–80	80–90	90–100
Frequency	3	7	12	15	8	3	2

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6. Find the Variance and Standard deviations of the following frequency distribution:

x_i	4	8	11	17	20	24	32
f_i	3	5	9	5	4	3	1

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7. Find the mean deviation about the mean for the following data:

Marks	0–10	10–20	20–30	30–40	40–50	50–60	60–70
Students	6	5	8	15	7	6	3

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Probability Very Short Answer Type Questions

1. Suppose A and B are independent events with P (A)= 0.6 P (B) = 0.7.

Compute

$P(A \cap B)$

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2. Suppose A and B are independent events with P (A) = 0.6 & P (B) = 0.7

Compute

$P(A \cup B)$

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3. Suppose A and B are independent events with P (A) = 0.6 P (B) = 0.7.

Compute

$P(B/A)$

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4. Suppose A and B are independent events with P (A)= 0.6 P (B) = 0.7.

Compute

$P(A^c \cap B^c)$

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5. Find the probability that a non-leap year contains i) 53 sundays ii) 52 Sundays only.

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6. If A, B are independent events with P (A) =0.2, P (B) = 0.5 Find

$P\left(\frac{A}{B}\right)$

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7. If A, B are independent events with P (A) =0.2, P (B) = 0.5 Find

$P\left(\frac{B}{A}\right)$

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8. If A, B are independent events with P (A) =0.2, P (B) = 0.5 Find

$P(A \cap B)$

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9. If A, B are independent events with P (A) =0.2, P (B) = 0.5 Find

$P(A \cup B)$

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10. If A,B, are two events with $P(A \cup B) = 0.65,$ and $P(A \cap B) = 0.15,$ then find the value of $P\left(A^C\right) + P\left(B^C\right).$

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11. Suppose A and B are events with P(A)=0.5, P(B)=0.4 and $P(A \cap B) = 0.3.$ Find the probability that i) A does not occur,

ii) neither A nor B occurs.

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12. A problem in calculus is given to two students, A and B whose chances of solving it are 1/3, 1/4 respectively. Find the probability of the problem being solved if both of them try'independently.

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13. A speaks truth in 75% of the cases and B in 80% of the cases. Then the probability that their statements about an incident do not match , is

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14. If one card is drawn at random from a pack of cards then show that event of getting an ace and getting heart are independent events.

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15. The probability for a contractor to get a road contract is $\frac{2}{3}$ and to get a building contract is $\frac{5}{9}$. The probability to get atleast on contract is $\frac{4}{5}$. Find the probability to get both the contracts.

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16. If A,B,C are three independent events of an experiment. Such that $P\left(A \cap B^C \cap C^C\right) = \frac{1}{4}$

$P\left(A^C \cap B \cap C^C\right) = \frac{1}{8}, P\left(A^C \cap B^C \cap C^C\right) = \frac{1}{4}$

then find P(A),P(B)and P(C).

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17. State and prove multiplication theorem or probability.

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Probability Long Answer Type Questions

1. State and prove addition theorem on probability.

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2. State and prove Baye's theorem.

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3. A,B,C are three horses in a race. The probability of A to win the race is twice that of B and probability of B is twice that of C. What are the probability of A,B and C to win the race?

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4. Three boxes numbered I, II, III contain the ball as follows

	White	Black	Red
I	1	2	3
II	2	1	1
III	4	5	3

One box is randomly selected and a ball is drawn from it. If the ball is red, then find the probability that it is from box II.

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5. Three Urns have the following composition of balls.

Urn I : 1 white, 2 black

Urn II : 2 white, 1 black

III : 2 white, 2 black

One of the Urn is selected at random and a ball is drawn. It turns out to be white. Find the probability that it come from Urn III.

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6. Suppose that an, urn B_1 contains 2 white and.3 black balls and another urn B_2 contains 3 white and 4 black balls. One urn is selected at random and a ball is drawn from it: If the ball drawn is found black, find the probability that the urn chosen was B_1.

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Random Variables Probability Distributions Very Short Answer Type Questions

1. A poisson variable satisfies P(X= 1) = P (X = 2). Find P(X = 5).

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2. The mean and variance of a binomial distribution are 4 and 3 respectively. Fix the distribution and find $P(X \geq 1)$.

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3. The mean and variance of a Binomial variate are 2.4 and 1.44 respectively. Find the parameters, $P(X = 2)$ and $P(1 < X \leq 4)$.

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4. If X is a random variable with probability distribution $P(X = k) = \frac{(k+1)C}{2^k}, K = 0, 1, 2, \ldots.$ then find C.

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5. Find the constant C, so that

$F(x) = C\left(\frac{2}{3}\right)^x, x = 1, 2, 3. \ldots\ldots\ldots\ldots\ldots\ldots$ is the p.d.f of a discrete random variable X.

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6. The probability that a person chosen at random is left handed (in hand writing) is 0.1 what is the probability that in a group of ten people there is one and only one who is left handed.

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Random Variables Probability Distributions Long Answer Type Questions

1. The probability distribution of a random variable X is given below.

$X=x_i$	1	2	3	4	5
$P(X=x_i)$	k	2k	3k	4k	5k

Find the value of k, mean, also find variance of X.

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2. A random variable X has the following probability distribution.

$X=x_i$	0	1	2	3	4	5	6	7
$P(X=x)$	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

Find (i) k (ii) Mean (iii) $P(0 < X < 5)$

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3. The range of a random variable X is {0, 1, 2}. Given that

$P(X=0)=3c^3, P(X=1)=4c-10c^2, P(X=2)=5c-1.$ find the value of c

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4. The range of a random variable X is {0, 1, 2}. Given that $P(X=0)=3c^3, P(X=1)=4c-10c^2, P(X=2)=5c-1$ where c is constant.

Find (i) the value of c (ii) $P(X < 1)$

(iii) $P(1 < X \leq 2)$ (iv) $P(0 < X \leq 3)$

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5. Two dice are rolled and the probability distribution of the sum of the numbers on the dice is formed. Find mean of the sum.

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6. 3251 + 587 + 369 - ? = 3007

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Circles Very Short Answer Type Questions

1. Find the centre and radius of the circle $x^2 + y^2 + 6x + 8y - 96 = 0$.

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2. The radius of the circle $\left(1+m^2\right)\left(x^2+y^2\right)-2cx-2cmy=0$ is

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3. If $x^2+y^2+2gx+2fy=0$ represents a

circle with cerntre $(-4,-3)$ then find g, f

and the radius of the circle.

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4. Find the equation of the circle whose centre is (-1, 2) and which passes through (5, 6).

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5. If the circle $x^2+y^2-4x+6y+a=0$ has radius 4, find a.

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6. If $x^2 + y^2 - 6x + 4y - 12 = 0$ represents a circle, then find its parametric equations.

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7. Write the parametric equations of the circle $(x-3)^2 + (y-4)^2 = 8^2$.

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8. If the length of the tangent from $(5, 4)$ to the circle $x^2 + y^2 + 2ky = 0$ is 1 the n find k.

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9. If the length of the tangent from $(2, 5)$ to the circle $x^2 + y^2 - 5x + 4y + k = 0$ is $\sqrt{37}$ then find k.

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10. Find the equation of a circle which is concentirc with $x^2 = y^2 - 6x - 4y - 12 = 0$ and passing through $(-2, 14)$.

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11. If (1, 3), (2, k) are conjugate w.r.t $x^2 + y^2 = 35$, then find k.

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12. Find the value of k if the points (4,2) and (k-3) are conjugate points with respect to the circle $x^2 + y^2 - 5x + 8y + 6 = 0$

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13. Find the condition for the line lx+my+ n = 0 is a normal to the circle $x^2 + y^2 + 2gx + 2fy + c = 0.$

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14. Find the pole of ax + by + c = 0 with respect to the circle $x^2 + y^2 = r^2.$

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Circles Short Answer Type Questions

1. If a point P is moving such that the lengths of tangents drawn from P to the circles

$x^2 + y^2 - 4x - 6y - 12 = 0$ and

$x^2 + y^2 + 6x + 18y + 26 = 0$ are the ratio 2:3, then find the equation to the locus of P.

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2. Find the length of the chord intercepted

by the circle $x^2 + y^2 - x3y - 22 = 0$ on

the line $y = x - 3$

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3. Show that $x + y + 1 = 0$ touches the circle

$x^2 + y^2 - 3x + 7y14 = 0$ and find its

point of contact.

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4. (i) Find the equation of the tangents to the circle $x^2 + y^2 - 4x + 6y - 12 = 0$ which are parallel to $x + y - 8 = 0$

(ii) Find the equations of the tangents to the circle $x^2 + y^2 - 5x + 6y - 12 = 0$ which are paralel to $x + 2y - 8 = 0$

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5. If 2kx + 3y - 1 = 0 , 2x + y + 5 = 0 are conjugate lines with respect to the circle $x^2 + y^2 - 2x - 4y - 4 = 0$, t hen k =

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6. The power of the point (1, 2) w.r.t the circle x^2 + y^2-4x-6y - 12 =0 is

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Circles Long Answer Type Questions

1. Find the equation of the circle passing through the points

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

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2. Find the equation of the circle passing through (2, 1), (5, 5), (-6, 7).

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3. The points (1, 1), (- 6, 0), (-2, 2). (-2,-8) are

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4. If (2,0),(0,1),(4,5) and (0,c) are concyclic then find c.

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5. Find the equation of the circle passing through (2,-3) , (-4,5) and having the centre on 4x+ 3y+1=0 .

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6. Find the equation of a circle which passes through $(4, 1)(6, 5)$ and having the centre on $4x + 3y - 24 = 0$

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7. Find the equation of the circle whose centre lies on the X- axis and passing through $(-2, 3)$ and $(4, 5)$

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8. Show that the circles

$x^2 + y^2 - 4x - 6y - 12 = 0$ and

$x^2 + y^2 + 6x + 18y + 26 = 0$ touch each

other. Also find the point of contact and

common tangent at this point of contact.

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9. Show that $x^2 + y^2 - 6x - 9y + 13 = 0, x^2 + y^2 - 2x - 16y = 0$

touch each other . Find the point of contact and the equation of common

tangent at their point of contact.

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10. Show that the circles

$x^2 + y^2 - 4x - 6y - 12 = 0$ and

$5(x^2 + y^2) - 8x - 14y - 32 = 0$ touch each

other and find their point of contact.

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11. Show that the circles $x^2 + y^2 - 6x - 2y + 1 = 0, x^2 + y^2 + 2x - 8y + 13 = 0$ touch each other find the point of contact and the equation of the common tangent at their point of contact.

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12. Find the direct common tangents of the circles $x^2 + y^2 + 22x - 4y - 100 = 0$ and $x^2 + y^2 - 22x + 4y + 100 = 0$

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13. Find the transberes common tangents of the circles $x^2 + y^2 - 4x - 10y + 28 = 0$ and $x^2 + y^2 + 4x - 6y + 40.$

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System Of Circless Very Short Answer Type Questions

1. Show that the circles given by the following equation intersect each other orthogonally.

$x^2 + y^2 - 2x - 2y - 7 = 0,$

$3x^2 + 3y^2 - 8x + 29y = 0.$

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2. Find k if the following pairs of circles are orthogonal.

$x^2 + y^2 + 4x + 8 = 0, x^2 + y^2 - 16y + k = 0$

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3. Find the angle between the circles given by the equations.

$x^2 + y^2 - 12x - 6y + 41 = 0,$

$x^2 + y^2 + 4x + 6y - 59 = 0.$

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4. Show that the angle between the circles

$x^2 + y^2 = x^2 + y^2 = ax + ay$ is $\frac{3\pi}{4}$.

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5. Find the equation of the radical axis of the circles represented by

$2x^2 + 2y^2 + 3x + 6y - 5 = 0$ and $3x^2 + 3y^2 - 7x + 8y - 11 = 0$

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6. Let us find the equation the radical axis of the circles S

$\equiv x^2 + y^2 - 5x + 6y + 12 = 0$

and $S^1 \equiv x^2 + y^2 + 6x - 4y - 14 = 0$

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7. find the equation of the common tangent of the following circles at their point of contact.

$x^2 + y^2 + 10x - 2y + 22 = 0,$

$x^2 + y^2 + 2x - 8y + 8 = 0.$

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System Of Circless Short Answer Type Questions

1. Find the equation of the circle which passes through the origin and intersects the circles below, orthogonally.

$x^2 + y^2 - 4x + 6y + 10 = 0.$

$x^2 + y^2 + 12y + 6 = 0.$

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2. Find the equation of the circle passing through the points of intersection of the circles $x^2 + y^2 - 8x - 6y - 21 = 0$

$x^2 + y^2 - 2x - 15 = 0$ and $(1, 2)$

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3. The equation of the circle which cuts orthogonally the three circles, $x^2 + y^2 + 2x + 17y + 4 = 0, x^2 + y^2 + 7x + 6y + 11 = 0, x^2 + y^2 - x +$

is

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4. If x+y=3 is the equation of the chord AB of the circle $x^2 + y^2 - 2x + 4y - 8 = 0$, find the equation of the circle having as diameter.

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5. Find the equation and length of the common chord of the two circles

$S = x^2 + y^2 + 3x + 5y + 4 = 0$ and $S = x^2 + y^2 + 5x + 3y + 4 = 0$

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6. The radical centre of the circles $x^2 + y^2 - 4x - 6y + 5 = 0$,

$x^2 + y^2 - 2x - 4y - 1 = 0$ and $x^2 + y^2 - 6x - 2y = 0 = 0$ lies on the line

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7. Show that the circles

$x^2 + y^2 + 2ax + c = 0$ and $x^2 + y^2 + 2by + c = 0$ to touch each other if $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{c}$

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Parabola Very Short Answer Type Questions

1. Find the equation of the parabola whose vertex is (3,-2), focus is (3, 1).

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2. Find the equation of the parabola whose focus is S (1,-7) and vertex is A(1,-2).

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3. Find the co-ordinates of the point on the parabola $y^2 = 8x$ whose focal distance is 10.

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4. Find the coordinates of the points on the parabola $y^2 = 2x$ whose focal distance is $\frac{5}{2}$.

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5. If ((1)/(2),2) is one extermity of a focalchord of the parabola $y^2 = 8x$.

Find the co-ordinates of the other extremity.

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6. Find the value of k if the line 2y=5x+k is a tangent to the parabola $y^2 = 6x$

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7. Show that the line 2x-y + 2 = 0 is a tangent to the parabola $y^2 = 16x$.

Find the point of contact also.

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8. Find the equation of tangent to $y^2 = 16x$ inclined at an angle 60° with its axis also find its point of contact.

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Parabola Long Answer Type Questions

1. Derive the standard form of the parabola.

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2. Find the vertex, focus, equation of directrix and axis, of parabolas

y^2- x + 4y + 5 = 0

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3. Find the equation of the parabola passing through the points (-1,2),(1,-1) and (2,1) and having its axis parallel to the X-axis.

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4. Find the equation of the parabola whose axis is parallel to Y-axis and which passes through the points (4,5),(-2,11) and (-4,21).

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5. Show that the equation of common tangents to the circle $x^2 + y^2 = 2a^2$ and the parabola $y^2 = 8ax$ are $y = \pm(x + 2a)$.

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6. Prove that the area of the triangle inscrbed in the paravbola $y^2 = 4ax$ is

$\frac{1}{18a}|(y_1 - y_2)(y_2 - y_2)(y_3 - y_1)|$ sq. units

where y_1, y_2, y_3 are the ordinates of its vertices.

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7. Prove that the area of the triangle formed by the tangents at $(x_1, y_1), (x_2)\text{and}(x_3, y_3)$ to the parabola $y^2 = 4ax(a > 0)$ is $\frac{1}{16a}|(y_1 - y_2)(y_2 - y_3)(y_3 - y_1)|$ sq.units.

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8. The normal at a point t_1 on $y^2 = 4ax$ meets the parabola again in the point t_2. Then prove that $t_1 t_2 + t_1^2 + 2 = 0$

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Ellipse Very Short Answer Type Questions

1. Find the equation of the ellise in the standard form whose distance between foci is 2 and the length of latus rectum is $\frac{15}{2}$.

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2. Find the equation of the ellipse in the standard form given latus rectum =4 and distance between foci is $4\sqrt{2}$

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3. Find the equation of the ellipse with focus at (1,-1) e=$\frac{2}{3}$ and directrix as $x + y + 2 = 0.$

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4. Find the coordinates of the foci, the vertices, the lengths of major and minor axes and the eccentricity of the ellipse $9x^2 + 4y^2 = 36$

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5. Find the eccentricity, co ordinates of foci-length of latus rectum and equation of directrices of the folloeing ellipses.

$9x^2 + 16y^2 - 36x + 32y - 92 = 0$

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6. Find the length of major axis,minor axis, latus rectum, eccentricity co-ordinates of centre, foci and the equations of directrices of the following ellipse.

$4x^2 + y^2 - 8x + 2y + 1 = 0$

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7. Find the equation of the tangents to $9x^2 + 16y^2 = 144$, which makes equal intercepts on the co-ordianate axis.

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8. Find the equations of tangents to the ellipse $2x^2 + y^2 = 8$ which are Parallel to x-2y-4=0

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9. Find the equations of tangents to the ellipse $2x^2 + y^2 = 8$ which are perpendicular to x+y+2=0

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10. Find the equation of the tangent and normal to the ellipse $9x^2 + 16y^2 = 144$ at the end of the latus rectum in the first quadrant.

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11. Find the equation of the chord joining point $P(\alpha)$ and $Q(\beta)$ on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1.$

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12. Show that the points of intersection of the perpendicular tangents to an ellipse lies on a circle.

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13. Show that the locus of the feet of the perpendiculars drawn from the foci to any tangent of the ellipse is the auxiliary circle

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14. Find the equations of tangent and normal to the ellipse $2x^2 + 3y^2 = 11$ at the point whose ordinate is 1.

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15. The tangent and normal to the ellipse $x^2 + 4y^2 = 4$ at a point $P(\theta)$ on it meets the major axis in Q and R respectively.If $\theta < \theta < \frac{\pi}{2}$ and $QR = 2$ then show that $\theta = \cos^{-1}\left(\frac{2}{3}\right)$.

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Hyperbola Very Short Answer Type Questions

1. If e_1, e_2, are the eccentricities of a hyperbola, its conjugate hyperbola, prove that $\frac{1}{e_1^2} + \frac{1}{e_2^2} = 1$.

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2. Find the equations of the hyperbola whose foci are $(\pm 5, 0)$, the transverse axis is of length 8.

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3. If the eccentricity of a hyperbola is $\frac{5}{4}$, then find the eccentricity of its conjugate-hyperbola.

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4. If 3x - 4y + k = 0 is a tangent to $x^2 - 4y^2 = 5$ find the value of k.

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5. A : The angle between the asymptotes $x^2 - y^2 = 2\text{is} \quad \pi/2$

R: The angle between the asymptotes of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1\text{is}2\frac{\tan^{-1}(b)}{a}$

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6. If the angle between the asymptotes is 30° then find its eccentricity.

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Hyperbola Short Answer Type Questions

1. Find the equation of the ellipse whose focus is (0,3),eccentricity is $\frac{3}{5}$ and the directrix is 3y - 25 = 0

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2. Find the centre, foci, eccentricity equation of the directrices, length of the latus rectum of the hyperbola.

$16y^2 - 9x^2 = 144$

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3. Find the centre, foci, eccentricity equation of the directrices, length of the latus rectum of the hyperbola.

$x^2 - 4y^2 = 4$

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4. Find the equations of the tangents to the hyperbola $3x^2 - 4y^2 = 12$ which are (i) parallel and (ii) perpendicular to the line y = x - 7

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5. Find the equation of tangents to, the hyperbola $x^2 - 4y^2 = 4$ which are parallel x+2y=0.

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6. Find the equation of the tangents to the hyperbola $x^2 - 4y^2 = 4$ which are

Perpendicular to the line $x + 2y = 0$

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7. Tangents to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ make angle θ_1, θ_2 with transvrse axis of a hyperbola. Show that the points of intersection of these tangents lies on the curve $2xy = k\left(x^2 - a^2\right)$ when $\tan\theta_1 + \tan\theta_2 = k$

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8. Prove that the points of intersection of two perpendicular tangents to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ lies on the circle $x^2 + y^2 = a^2 - b^2$

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9. Find the equation of the tangents drawn to the hyperbola $2x^2 - 3y^2 = 6$ through $(-2, 1)$

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Indefinite Integrals Very Short Answer Type Questions

1. $\int\left(x+\frac{1}{x}\right)^3 dx$

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2. Evaluate the integerals.

$\int\frac{(3x+1)^2}{2x}dx x \in I \subset R\backslash\{0\}$

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3. Evaluate the integerals.

$\int\frac{1}{\cos hx+\sin hx}dx on R.$

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4. $\int\frac{1+\cos x}{1-\cos x}dx =$

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5. Evaluate the integerals.

$$\int \frac{1}{1+\cos x} dx on$$

$$I \subset \backslash\{(2n+1)\pi : \in Z\}.$$

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6. $\int \sec^2 \operatorname{cosec}^2 x dx =$

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7. Evaluate the integerals.

$$\int \frac{(a^x - b^x)^2}{a^x b^x} dx,$$

$$(a > 0, a \neq 1 \text{ and } b > 0, b \neq 1) on R.$$

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8. Evaluate the integerals.

$$\int \frac{\sin(\log x)}{x} dx on(-1, \infty)$$

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9. Evaluate the following integrals.

$$\int \frac{\log(1+x)}{1+x} dx$$

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10. Evaluate the integerals.

$$\int \frac{1}{x \log x [\log g(\log x)]} dx on(1, \infty)$$

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11. Find $\int \left(1 - \frac{1}{x^2}\right) e^{\left(x + \frac{1}{x}\right)} dx$ on I where $I = (0, \infty)$.

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12. Evaluate : $\int \frac{e^{\times}(1+x)}{\cos^2(xe^{\times})}dx$ on $I \subset R/\{x \in R : \cos(xe) = 0\}$

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13. Evaluate the integerals.

$\int \frac{\sin\left(\tan^{-1} x\right)}{1+x^2}dx, x \in R.$

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14. Evaluate the following integrals.

$\int \frac{x^8}{1+x^{18}}dx$

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15. Evalute the following integrals

$\int \frac{2x^3}{1+x^8}$ dx

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16. $\int \sec x \log(\sec x + \tan x) dx =$

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17. $\int e^{-x}(\sin x - \cos x) dx =$

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18. Evaluate the integerals.

$\int e^x (\sec x + \sec x, \tan x) dx on I \subset R \setminus$

$\left\{(2n+1)\frac{\pi}{2} : n \in Z\right\}.$

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19. Evalute the following integrals

$\int e^x$ (tan x + log sec x) dx

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20. Evalute the following integrals

$\int e^x \left(\frac{x \log x + 1}{x} \right)$ dx

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21. $\int e^x \frac{(1+x)}{(2+x)^2} dx$

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22. Evaluate the following integrals.

$\int \frac{dx}{(x+5)\sqrt{x+4}}$

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23. $\int \frac{dx}{(x+1)(x+2)}$

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24. $\int \log x dx =$

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25. Evalute the following integrals

$\int$ x log x dx

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Indefinite Integrals Long Answer Type Questions

1. Evaluate $\int \frac{1}{4+5\sin x} dx$

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2. $\int \frac{dx}{3\cos x + 4\sin x + 6}$

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3. $A: \int \frac{2\cos x + 3\sin x}{4\cos x + 5\sin x} dx =$
$\frac{-2}{41}\log|4\cos x + 5\sin x| + \frac{23}{41}x + c$
$R: \int \frac{a\cos x + b\sin x}{c\cos x + d\sin x} dx =$
$\frac{ac + bd}{c^2 + d^2}x + \frac{ad - bc}{c^2 + d^2}\log|c\cos x + d\sin x| + k$

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4. Evaluate $\int \frac{9\cos x - \sin x}{4\sin x + 5\cos x} dx$

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5. Evaluate $\int \frac{\cos x + 3\sin x + 7}{\cos x + \sin x + 1}\,dx$.

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6. Evaluate $\int \frac{x+1}{x^2+3x+12}dx.$

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7. Evaluate $\int \frac{2x+5}{\sqrt{x^2-2x+10}}dx.$

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8. $\int (6x+5)\sqrt{6-2x^2+x}dx$

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

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10. Obtain reduction formula for $I_n = \int \sin^n x dx$ for an integer $n \geq 2$ and deduce the value of $\int \sin^4 x dx$.

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11. Evaluate the reduction formula for $I_n = \int \cos^n x dx$ and hence find $\int \cos^4 x dx$.

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12. Evaluate $\int \tan^6 x dx$

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13. Obtain reduction formula for $I_n = \int \cot^n x dx$, n being a positive integer , $n \geq 2$ and deduce the value of $\int \cot^4 x dx$.

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14. Obtain reduction formula for

$I_n = \int \cos ec^n x dx, n$ being a positive integer, $n \geq 2$ and deduce the value of $\int \cos ec^5 x dx$.

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15. $\int \sec^5 x dx$.

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Definite Integrals Very Short Answer Type Questions

1. $\int_0^1 (x^2)(1+x^2)\,dx =$

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2. Evaluate the following integrals

(iv) $\int_0^4 \frac{x^2}{1+x}\,dx$

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3. $\int_2^3 (2x)(1+x^2)\,dx$

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4. $\int_0^1 \frac{dx}{\sqrt{3-2x}}$

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5. Evaluate the definite integrals .

$$I = \int_1^5 \frac{dx}{\sqrt{2x-1}}$$

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6. Evaluate the definite integrals .

$$I = \int_0^3 \frac{x}{\sqrt{x^2+16}dx}$$

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7. Evaluate $\int_0^a \frac{dx}{x^2+a^2}$

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8. Evaluate the definite integrals .

$$\int_0^{\pi} \sqrt{2+2\cos\theta}d\theta$$

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9. $\int_0^2 |1-x|dx$

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10. Evaluate the integrals .

$\int_0^4 |2-x|dx$

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11. Evaluate $\int_0^a \sqrt{a^2-x^2}dx$

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12. Evaluate the integrals .

$$\int_0^{\pi/2} \frac{\sin^5 x}{\sin^5 x + \cos^5 x} dx$$

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13. Evaluate $\int_0^{\pi/2} \frac{\cos^{5/2} x}{\sin^{5/2} x = \cos^{5/2} x} dx$

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14. Find the values of the following integrals

(iii) $\int_0^{\frac{\pi}{2}} \cos^{11} x dx$

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15. Find the area enclosed with in the curve

$y^2 = 3x, x = 3$

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16. Find the area of the region bounded by $y = x^3 + 3$, x-axis, x = -1 and x = 2.

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17. Find the area bounded between the curves $y = x^2, y = \sqrt{x}$

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Definite Integrals Short Answer Type Questions

1. Evaluate the integral

$$\int_0^{\pi/2} \frac{dx}{4 + 5\cos x}$$

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2. Evaluate $\int_0^{\pi} \frac{1}{3+2\cos x} dx$

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3. Evaluate $\int_0^{\pi/2} \frac{a\sin x + b\cos x}{\sin x + \cos x} dx$

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4. Find the area enclosed between $y = x^2 - 5x$ and $y = 4 - 2x$

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5. Find the area bounded between the curves $y = x^2$, $y = \sqrt{x}$

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Definite Integrals Long Answer Type Questions

1. Evaluate the following integrals

$$\int_0^{\frac{\pi}{4}} \frac{\sin x + \cos x}{9 + 16 \sin 2x} dx$$

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2. $\int_0^{\infty} \frac{\log(1 + x^2)}{1 + x^2} dx =$

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3. Evaluate : $\int_0^{\frac{\pi}{4}} \log(1 + \tan x) dx$

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4. $\int_0^{\pi} \frac{x \sin x}{1 + \cos^2 x} dx =$

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5. $\int_0^{\pi} \frac{x \sin x}{1+\cos^2 x} dx =$

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6. $\int_0^{\pi} -\frac{\sin^3 x}{1+\cos^3 x} dx$

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7. Evaluate

(i) $\int_0^{\frac{\pi}{2}} \frac{\sin^2 x}{\sin x + \cos x} dx$

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8. Show that $\int_0^{\pi/2} \frac{x}{\sin x + \cos x} dx = \frac{\pi}{2\sqrt{2}} \log\left(\sqrt{2}+1\right)$.

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9. The area included between the parabolas $y^2 = 4ax, x^2 = 4by$ is

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10. Show that the area of the region bounded by $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ (ellipse) is π ab. Also deduce the area of the circle $x^2 + y^2 = a^2$

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Differential Equations Very Short Answer Type Questions

1. Find the order and degree of

$$\left(\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^3\right)^{\frac{6}{5}} = 6y$$

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2. Find the order and degree of $\frac{d^2y}{dx^2} = \left[1 + \left(\frac{dy}{dx}\right)^2\right]^{5/3}$

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3. Find the order and degree of $\left[\left(\frac{dy}{dx}\right)^{1/2} + \left(\frac{d^2y}{dx^2}\right)^{1/2}\right]^{1/4} = 0$

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4. Find the order and degree of $1 + \left(\frac{d^2y}{dx^2}\right)^2 = \left[2 + \left(\frac{dy}{dx}\right)^2\right]^{3/2}$

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5. Find the order and degree of the D.E $x^{1/2}\left(\frac{d^2y}{dx^2}\right)^{\frac{1}{3}} + x\frac{dy}{dx} + y = 0.$

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6. Form the differential equation corresponding to $y = A\cos 3x + B\sin 3x,$ where A and B are parameters.

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7. Form the D.E corresponding to $y = cx - 2c^2$ where c is a parameter.

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8. Find the order and degree of the D.E of the family of circles with their centres at the origin.

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9. Find the general solution of $\frac{dy}{dx} = e^{x+y}.$

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10. Find the general solution of $x + y\frac{dy}{dx} = 0.$

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Differential Equations Short Answer Type Questions

1. The solution of $\left(xy^2 + x\right)dx + \left(yx^2 + y\right)dy = 0$ is

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2. The general solution of $\tan y \sec^2 x dx + \tan x \sec^2 y dy = 0$ is

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3. The solution of $(e^x + 1)ydy + (y + 1)dx = 0$ is

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4. The solution of $\frac{dy}{dx} = \tan^2(x+y)$ is

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5. Solve $\frac{dy}{dx} - x\tan(y-x) = 1$

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6. Solve the following differential equations.

$\sin^{-1}\left(\frac{dy}{dx}\right) = x + y$

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7. The solution of $(x+y+1)\frac{dy}{dx} = 1$ is

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8. The general solution of $y^2dx + \left(x^2 - xy + y^2\right)dy = 0$ is

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9. Solve the following differential equations.

$\left(x^2 - y^2\right)dx - xydy = 0$

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10. Solve $\left(x^3 - 3xy^2\right)dx + \left(3x^2y - y^3\right)dy = 0$

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11. Solve $xy^2dy - \left(x^3 + y^3\right)dx = 0.$

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12. Solve $\frac{dy}{dx} = e^{x-y} + x^2 e^{-y}$.

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13. Solve the following differential equations.

$\frac{dy}{dx} + y \tan x = \sin x$

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14. Solve the following differential equations.

$\frac{dy}{dx} + y \tan x = \cos^3 x$

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15. Solve the following differential equations.

$\left(1 + x^2\right) \frac{dy}{dx} + y = \tan^{-1} x.$

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16. The solution of $\left(1+x^2\right)\frac{dy}{dx}+y=e^{\tan^{-1}x}$ is

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17. The solution of $\left(1+y^2\right)dx=\left(\tan^{-1}y-x\right)dy$ is

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Differential Equations Long Answer Type Questions

1. Solve $\left(x^2+y^2\right)dx=2xydy$

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2. Give the solution of $x\ \sin^2\frac{y}{x}dx=ydx-xdy$ which passes through the point $\left(1,\frac{\pi}{4}\right)$.

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3. Solve the following differential equations.

$(x - y)dy = (x + y + 1)dx$

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4. Solve the following differential equations.

$\left(x^2y - 2xy^2\right)dx = \left(x^3 - 3x^2y\right)dy$

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5. Solve the following differential equations.

$$\frac{dy}{dx} = \frac{x + 2y + 3}{2x + 3y + 4}$$

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6. Solve the following differential equations.

$(2x + y + 1)dx + (4x + 2y - 1)dy = 0$

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7. Solve the following differential equations.

$$\frac{dy}{dx} = \frac{4x + 6y + 5}{3y + 2x + 4}$$

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8. Find the general solution of the following D.E's

(i) $\frac{dy}{dx} = \frac{x - y + 3}{2x - 2y + 5}$

(ii) $(x - y)dy = (x + y + 1)dx$

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