MOST IMPORTANT QUESTIONS (BOOK - 2)

XII CBSE BOARD 2024- 25

Ch - 7 INTEGRALS

Q1. Find : $\int \frac{\sin x}{\sin(x-2a)}\, dx$

Q2.Evaluate : $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sin x+\cos x}{\sqrt{\sin 2x}}$ dx

Q3. Find : $\int_0^{\frac{\pi}{2}} \frac{dx}{cos^3 x\, \sqrt{2\sin 2x}}$

Q4. Evaluate : $\int \frac{dx}{\sqrt{5-4x-2x^2}}$ dx

Q5. Evaluate : $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{dx}{1+\sqrt{\tan x}}$

Q6.Find $\left(\int \frac{\log x}{(x+1)^2}\, dx\right)$

Q7.Evaluate $\int \frac{dx}{x\,(x^5+3)}$

Q8. Evaluate $\int \frac{(x-4)e^x}{(x-2)^3}$

Q9. Given $\int e^x (\tan x + 1)\, secxdx = e^x f(x) + C$ Write f(x) satisfying the above.

Q10. Evaluate : $\int \frac{\tan\theta + tan^3\theta}{1+tan^3\theta}$ dθ .

Q11.Evaluate : $\int \frac{\sin(x-a)}{\sin(x+a)}$ dx

Q12.Evaluate : $\int e^x \left(\frac{\sin 4x-4}{1-\cos 4x}\right) dx$

Q13.Evaluate : $\int \frac{x^2}{(x^2+4)(x^2+9)}$ dx

Q14.Find : $\int 5^{5^{5x}} . 5^{5x} . 5^x . dx$

Q15.Find : $\int \sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}}$ dx

Q16. Evaluate: $\int e^{2x} . \sin(3x+1) dx$

Q17.Find : $\int \frac{1}{\sqrt{x}\,(\sqrt{x}+1)(\sqrt{x}+2)}$ dx

Q18. Evaluate : $\int_{-a}^{a} f(x)dx$, $where\ f(x) = \frac{9^x}{1+9^x}$.

Q19. $\int_0^{\frac{\pi}{2}} [\log(\sin x) - \log(2\cos x)]\, dx$

Q20. $\int_0^{\frac{\pi}{2}} |\sin x - \cos x|\, dx$

Ch - 8 APPLICATION OF INTEGRALS

Q1. Using integration, find the area of the region bounded by lines x – y + 1 = 0, x = -2, x = 3 and x – axis.

Q2. 0. Using integration, find the area of the region bounded by the curves: y = I x + 1 I + 1 , x = -3 , x = 3 ,y = 0 .

∴ Required area = $\int_{-3}^{-1}(-x)dx + \int_{-1}^{3}(x+2)$ dx

Q3. Using integration, find the area of the region in the first quadrant enclosed by the X-axis, the line $y = x$ and the circle $x^2 + y^2 = 32$.

Q4. Find the area bounded by the circle $x^2 + y^2 = 16$ and the line $\sqrt{3}y = x$ in the first quadrant, using integration.

Q5. Using integration find the area of the triangular region whose sides have equations $y = 2x + 1$, $y = 3x + 1$ and $x = 4$.

Q6. A farmer has a field of shape bounded by $x = y^2$ and $x = 3$, he wants to divide this into his two sons equally by a straight line $x = c$ Can you find c?

Q7. Find the area of the region { (x,y) : $x^2 + y^2 \leq 4$, $x + y \geq 2$ } .

Q8. Find the area of the region { (x,y) : $x^2 \leq y \leq |x|$ }.

Q9. The ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is divided into two parts by a b the line $2x = a$. Find the area of the smaller part.

Q10. Using integration, find the area of the region bounded by the triangle whose vertices are (−1,2), (1,5)and (3,4).

Q11. Find the area of the smaller region bounded by the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ and the line $\frac{x}{3} + \frac{y}{2} = 1$.

Q12.Find the area of the region bounded by the curve y = $\sqrt{x}$, the line x = 2y + 3 and the x – axis , using integration .

Q13.Using integration , find the area of region bounded by line y = $\sqrt{3}\,x$, the curve y = $\sqrt{4 - x^2}$ and y – axis in first quadrant .

Q14.Find the area of the region enclosed by the curves $y^2 = x$, x = $\frac{1}{4}$, y = 0 and x = 1, using integration .

Q15.Find the area of the region {(x, y) : $x^2 \leq y \leq x + 2$ }, using integration .

Q16.Using integration , find the area of the region { (x,y) : $y^2 \leq x \leq y$ }

Q17. Using integration , find the area of the region bounded by the triangle ABC when its sides are given by the lines 4x – y + 5 = 0 , x + y – 5 = 0 and x – 4y + 5 = 0 .

Q18.Draw the rough sketch of the curve y = 10 cos 2x : where $\frac{\pi}{6} \leq x \leq \frac{\pi}{3}$. Using integration , find the area of region bounded by y = 10 cos 2x from the ordinate x = $\frac{\pi}{6}$ to x = $\frac{\pi}{2}$ and the x – axis .

Q19.Make a rough sketch of the region { (x,y) : $0 \leq y \leq x^2 + 1$, $0 \leq y \leq x + 1$, $0 \leq x \leq 2$ } and find the area of the region , using the method of integration .

Q20. Find the area enclosed between the parabola $4y = 3x^2$ and the straight line 3x – 2y + 12 = 0 .

Ch- 9 DIFFERENTIAL EQUATIONS

Q1. Prove that $x^2 - y^2 = C(x^2 + y^2)^2$ is the general solution of the differential equation $(x^3 - 3xy^2)\,dx = (y^3 - 3x^2 y)\,dy$. Where C is a parameter.

Q2. Solve the differential equation : $(x + 1)\frac{dy}{dx} = 2e^{-1} - 1$; $y(0) = 0$.

Q3. Find order & degree of differential equation: $\frac{d^4y}{dx^4} + \sin\left(\frac{d^3y}{dx^3}\right) = 0$.

Q4. Solve the differential equation.$y\log y\,dx - x\,dy = 0$

Q5.Solve : $(1 + e^{\frac{x}{y}})\,dx + e^{\frac{x}{y}}(1 - \frac{x}{y})\,dy$.

Q6. Solve the differential equation: $(x^2 - 1)\frac{dy}{dx} + 2xy = \frac{2}{x^2-1}$, where $x \in (-\infty, -1)\ U\ (1, \infty)$.

Q7. Solve the differential equation: $x\frac{dy}{dx}\sin\left(\frac{y}{x}\right) + x - y\sin\left(\frac{y}{x}\right) = 0$ s homogeneous. Find the particular solution of this differential equation, given that $x = 1$, when $y = \frac{\pi}{2}$.

Q8. Solve the differential equation: $\sqrt{1 + x^2 + y^2 + x^2y^2} + xy\frac{dy}{dx} = 0$.

Q9. Show that the differential equation $(x - y)\frac{dy}{dx} = x + 2y$, is homogeneous and solve it.

Q10. Find the particular solution of the differential equation $(1 + x^3)\frac{dy}{dx} + 6x^2 y = (1 + x^2)$, given that $y = 1$ $when\ x = 1$.

Q11. Find the particular solution of the differential equation $\frac{dy}{dx} = \frac{x(2\log x + 1)}{\sin y + y\cos y}$ given that $y = \frac{\pi}{2}$, when $x = 1$.

Q12. Solve the following differential equation: $x\cos\left(\frac{y}{x}\right)\frac{dy}{dx} = y\cos\left(\frac{y}{x}\right) + x$; $x \neq 0$.

Q13. Find the general solution of the following differential equation: $(1 + y^2) + (x - e^{tan^{-1}}\ y)\frac{dy}{dx} = 0$.

Q14. Find the particular solution of the differential equation $\frac{dy}{dx} = \sin(x + y) + \sin(x - y)$, given that when $x = \frac{\pi}{4}$, $y = 0$.

Q15. Find the general solution of the differential equation : $(x^2 + 1)\frac{dy}{dx} + 2xy = \sqrt{x^2 + 4}$

Q16. Find the general solution of the differential equation : $\log\left(\frac{dy}{dx}\right) = ax + by$.

Q17. Find the general solution of the differential equation : $x\frac{dy}{dx} + y + \frac{1}{1+x^2} = 0$, given that $y(1) = 0$.

Q18. Solve the differential equation $ye^{\frac{x}{y}}\,dx = \left(xe^{\frac{x}{y}} + y^2\right)dy$, $(y \neq 0)$.

Q19. Solve the differential equation : $(\cos^2 x)\frac{dy}{dx} + y = \tan x$; $\left(0 \leq x \leq \frac{\pi}{2}\right)$.

Q20. Find the particular solution of the differential equation $x\frac{dy}{dx} + y = x\,cosx + sinx$; $given\ y\left(\frac{\pi}{2}\right) = 1$

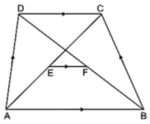
Ch - 10 VECTOR ALGEBRA

Q1.If $\vec{a} = 4\hat{\imath} - \hat{\jmath} + \hat{k}$ and $\vec{b} = 2\hat{\imath} - 2\hat{\jmath} + \hat{k}$ then find a unit vector along the vector $\vec{a} \times \vec{b}$.

Q2. Find the area of a parallelogram whose adjacent sides are determined by the vectors $\vec{a} = \hat{\imath} - \hat{\jmath} + 3\hat{k}$ and $\vec{b} = 2\hat{\imath} - 7\hat{\jmath} + \hat{k}$.

Q3. The two vectors $\hat{\jmath} + \hat{k}$ and $3\hat{\imath} - \hat{\jmath} + 4\hat{k}$ represent the two sides AB and AC, respectively of a ΔABC . Find the length of the median through A.

Q4. If $ABCD$ is a quadrilateral and E and F are the midpoints of AC and BD, prove that:
$\overrightarrow{AB} + \overrightarrow{AD} + \overrightarrow{CB} + \overrightarrow{CD} = 4\overrightarrow{EF}$.



Q5. If $\vec{a} = 2\hat{\imath} + 4\hat{\jmath} - 5\hat{k}$ and $\vec{b} = \hat{\imath} + 2\hat{\jmath} + 3\hat{k}$, Find the unit vector in the direction of $\vec{a} + \vec{b}$.

Q6. Write the position vector of the point which divides the join of points with position vector $3\vec{a} - 2\vec{b}$ and $2\vec{a} + 3\vec{b}$ in the ratio 2: 1 .

Q7. Find the direction cosines of the vector joining the points A(1,2, −3) and B(−1, −2,1) directed from B to A.

Q8. If $\vec{a} = \hat{\imath} + \hat{\jmath} + \hat{k}$ and $\vec{b} = \hat{\jmath} - \hat{k}$, find a vector $\vec{c}$ such that $\vec{a} \times \vec{c} = \vec{b}$ and $\vec{a} . \vec{c} = 3$.

Q9. If the vector $-\hat{\imath} + \hat{\jmath} - \hat{k}$ bisects the angle between the vector $\vec{c}$ and the vector $3\tilde{\imath} + 4\tilde{\jmath}$, then find the unit vector in the direction of $\vec{c}$.

Q10. Let $\vec{a} = 4\hat{\imath} + 5\hat{\jmath} - \hat{k}$, $\vec{b} = \hat{\imath} - 4\hat{\jmath} + 5\hat{k}$ and $\vec{c} = 3\hat{\imath} - \hat{\jmath} - \hat{k}$ .Find a vector $\vec{d}$ which is perpendicular to both $\vec{c}$ and $\vec{b}$ and $\vec{d} . \vec{a} = 21$.

Q11. Vectors $\vec{a}$, $\vec{b}$ and $\vec{c}$ are such that $\vec{a} + \vec{b} - \vec{c} = 0$ and $|\vec{a}| = 3$, $|\vec{b}| = 5$ and $|\vec{c}| = 7$. Find the angle between $\vec{a}$ and $\vec{b}$.

Q12. The two adjacent sides of a parallelogram are $2\tilde{\imath} - 4\tilde{\jmath} - 5\tilde{k}$ *and* $2\tilde{\imath} + 2\tilde{\jmath} + 3\tilde{k}$. Find the two unit vectors parallel to its diagonals. Using the diagonal vectors, find the area of the parallelogram.

Q13. Find the value of λ when scalar projection of $\vec{a} = \lambda\hat{\imath} + \hat{\jmath} + 4\hat{k}$ on $\vec{b} = 2\hat{\imath} + 6\hat{\jmath} + 3\hat{k}$ is 4 units .

Q14. If $\vec{a}$, $\vec{b}$ are two vectors such that $|\vec{a} + \vec{b}| = |\vec{a}|$,then prove that $2\vec{a} + \vec{b}$ is perpendicular to $\vec{b}$.

Q15. If $\vec{a} = \hat{\imath} - \hat{\jmath} + 7\hat{k}$ and $\vec{b} = 5\hat{\imath} - \hat{\jmath} + \lambda\hat{k}$, then find the value of λ so that the vectors $\vec{c} + \vec{b}$ and $\vec{a} - \vec{b}$ are orthogonal .

Q16. If vectors $\vec{a} = 2\hat{\imath} + 2\hat{\jmath} + 3\hat{k}$, $\vec{b} = -\hat{\imath} + 2\hat{\jmath} + \hat{k}$ and $\vec{c} = 3\hat{\imath} + \hat{\jmath}$ are such that $\vec{a} + \lambda\vec{b}$ is perpendicular to $\vec{c}$, then find the value of λ .

Q17. For two non – zero vectors $\vec{a}$ and $\vec{b}$, if $|\vec{a} - \vec{b}| = |\vec{a} + \vec{b}|$, then find the angle between $\vec{a}$ and $\vec{b}$.

Q18. $\vec{a}$ and $\vec{b}$ are two unit vectors such that $|2\vec{a} + 3\vec{b}| = |3\vec{a} - 2\vec{b}|$ .Find the angle between $\vec{a}$ *and* $\vec{b}$.

Q19. If I $\vec{a} \times \vec{b}$ I ^{2} + I $\vec{a}.\vec{b}$ I^2 = 400 and I $\vec{b}$ I = 5 ,then find the value of I $\vec{a}$ I .

Q20. If $\vec{a}$ and $\vec{b}$ are two vectors of equal magnitude and α is the angle between them ,then prove that $\frac{|\vec{a}+\vec{b}|}{|\vec{a}-\vec{b}|}$ = cot $\left(\frac{\alpha}{2}\right)$.

Ch - 11 THREE-DIMENSIONAL GEOMETRY

Q1. The Cartesian equation 0 a line AB is: $\frac{2x-1}{12} = \frac{y+2}{2} = \frac{z-3}{3}$.Find the direction cosines of a line parallel to line AB.

Q2.Show that the lines $\frac{x+1}{3} = \frac{y+3}{5} = \frac{z+5}{7}$ and $\frac{x-2}{1} = \frac{y-4}{3} = \frac{z-6}{5}$ intersect. Also find their point of intersection.

Q3. Find the equation of a line passing through the point (1, 2, -4) and perpendicular to two lines $\vec{r}$ = ($8\hat{\imath}-19\hat{\jmath}+10\hat{k}$) + $\lambda(3\hat{\imath}-16\hat{\jmath}+7\hat{k})$ *and* $\vec{r}$ = ($15\hat{\imath}-29\hat{\jmath}+5\hat{k}$) + μ ($3\hat{\imath}+8\hat{\jmath}-5\hat{k}$).

Q4.Find the value of p, so that the lines $l_1 : \frac{1-x}{3} = \frac{7y-14}{p} = \frac{z-3}{2}$ and $l_2 : \frac{7-7x}{3p} = \frac{y-5}{1} = \frac{6-z}{5}$and perpendicular to each other. Also find the equations of a line passing through a point (3,2,-4) and parallel to line l_1 .

Q5. Write the direction ratios of the vector $3\vec{a} + 2\vec{b}$ where , $\vec{a} = \hat{\imath} + \hat{\jmath} - 2\hat{k}$ and $\vec{b} = 2\hat{\imath} - 4\hat{\jmath} + 5\hat{k}$.

Q6. Show that the lines $\vec{r}$ =($\hat{\imath} + \hat{\jmath} - \hat{k}$) + λ ($3\hat{\imath} - \hat{\jmath}$) and $\vec{r}$ =($4\hat{\imath} - \hat{k}$) + μ ($2\hat{\imath} + 3\hat{k}$) intersect. Also find their point of intesection.

Q7. Find the shortest distance between the following lines : $\frac{x-3}{1} = \frac{y-5}{-2} = \frac{z-7}{1}$ and: $\frac{x+1}{7} = \frac{y+1}{-6} = \frac{z+1}{1}$.

Q8. Find the coordinates of the foot of perpendicular and the length of the perpendicular drawn from the point P(5, 4, 2) to the line $\vec{r}$ = ($-\hat{\imath}+3\hat{\jmath}+\hat{k}$) + $\lambda(2\hat{\imath}+3\hat{\jmath}-\hat{k})$. Also find the image of P in this line.

Q9.Find the coordinates of the image of the point (1,6,3) with respect to the line $\vec{r}$ =($\hat{\jmath} + 2\hat{k}$) + λ($\hat{\imath} + 2\hat{\jmath} + 3\hat{k}$) ; where '$\lambda$' is a scalar .Also ,find the distance of the image from the y - axis .

Q10.(i) Find the vector and Cartesian equations of the straight line passing through the point (-5 ,7 , -4) and in the direction of (3,-2, 1) .
(ii) Find the point where this straight line crosses the xy – plane .

Q11. Find the equation of the line which intersect the lines $\frac{x+2}{1} = \frac{y-3}{2} = \frac{z+1}{4}$ and $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and passes through the point (1,1,1) .

Q12. Find the coordinates of the foot of perpendicular drawn from the point (3,-1,11) to the line $\frac{x}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ .Hence ,write the equation of this perpendicular line .

Q13. Find the coordinates of the point where the line through the points (-1,1, -8) and (5,-2 , 10) crosses the ZX – plane.

Q14. Find the image of the point (2, -1 , 5) in the line $\frac{x-11}{10} = \frac{y+2}{-4} = \frac{z+8}{-11}$. Also find the equation of the line joining the given point and its image .Find the length so that line segment also.

Q15. An insect is crawling along the line $\vec{r}$ = $6\hat{\imath}$ + $2\hat{\jmath}$ + $2\hat{k}$ + λ ($i - 2\hat{\jmath} + 2\hat{k}$) and another insect is crawling along the line $\vec{r} = -4\hat{\imath} - \hat{k}$ + μ (3 – $2\hat{\jmath}$ – $2\hat{k}$). At what points on the lines should they reach so that the distance between them is the shortest? Find the shortest possible distance between them.

Q16. Prove that the line through A(0, -1, -1) and B(4, 5, 1) intersects the line through C(3, 9, 4) and D(-4,4,4).

Q17. Find the Cartesian equation of a line L_2 which is the mirror image of the line L_1 with respect to the line L : $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$,given that line L_1 passes through the point P (1,6,3) and is parallel to the line L.

Q18. Find the equation of the plane passing through the points (−1, 2, 0), (2, 2, −1) and parallel to the line $\frac{x-1}{1} = \frac{2y+1}{2} = \frac{z+1}{-1}$.

Q19. Find the direction cosines of the line $\frac{x+2}{2} = \frac{2y-7}{6} = \frac{5-z}{6}$. Also, find the vector equation of the line through the point A(-1, 2,3) and parallel to the given line.

Q20. The equations of motion of a rocket are:
x = 2t , y = -4t , z = 4t, where the time t is given in seconds, and the coordinates of a moving point are in km. What is the path of the rocket? At what distances will the rocket be from the starting point O(0,0,0) and from the following line in 10 seconds? $\vec{R}$ = $20\hat{\imath} - 10\hat{\jmath} + 40\hat{k}$ + μ $(10\hat{\imath} - 20\hat{\jmath} + 10\hat{k})$.

Ch – 12 LINEAR PROGRAMMING PROBLEM

Q1. Solve the following linear programming problem graphically.
Maximize: P = 70x + 40y
Subject to : 3x + 2y ≤ 9 , 3x + y ≤ 9 , $x \geq 0$, $y \geq 0$.

Q2. Find graphically, the maximum value of $z = 2x + 5y$, subject to constraints given below:
2x + 4y ≤ 8
3x + y ≤ 6
$x + y \leq 4$
x ≥ 0 , $y \geq 0$.

Q3. Solve the following linear programming problem graphically :
Maximize Z = $7x + 10y$
Subject to the constraints
4x + 6y ≤ 240
6x + 3y ≤ 240
x ≥ 10
x ≥ 0 , $y \geq 0$

Q4. Solve the following LPP graphically: Minimise $Z = 5x + 10y$ Subject to constraints $x + 2y \leq 120$, $x + y \geq 60$,$X - 2y \geq 0$ and $x, y \geq 0$

Q5. Maximise $Z = x + 2y$ Subject to the constraints: $x + 2y \geq 100$,$2x - y < 0$ $2x + y \leq 200$ $x, y \geq 0$ Solve the above LPP graphically.

Q6. Find graphically, the maximum value of $z = 2x + 5y$, subject to constraints given below: $2x + 4y \leq 8$, $3x + y \leq 6$, $x + y \leq 4$; $x \geq 0$, $y \geq 0$Q7

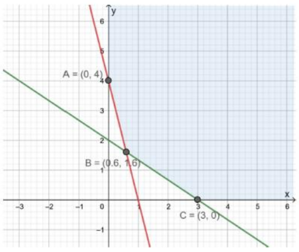
Q8. Let $z = x + y$, then the maximum of z subject to constraints $y \geq |x| - 1$, $y \leq 1 - |x|$, $x \geq 0$, $y \geq 0$.

Q9. Minimise $Z = 30x + 20y$ subject to $x + y \leq 8$, $x + 4y \geq 12$,$5x + 8y \geq 20$, $x, y \geq 0$.

Q10.Minimize : Z = 16 x + 20 y
Subject to contraints
$x + 2y \geq 10$,
$x + y \geq 6$,
$3x + y \geq 8$,
$x , y \geq 0$

Q11. Solve the LPP graphically :maximize Z : 400x + 300 y , subject to $x + y \leq 200$, $x \leq 40$, $x \geq 20$, $y \geq 0$.

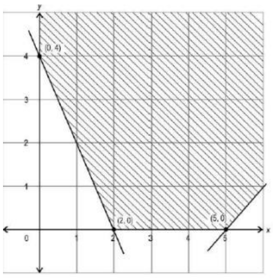
Q12.The corner points of the unbounded feasible region of an LPP are (0 , 4) , (0.6 , 1.6) and (3,0) as shown in the figure .The minimum value of the objective function Z = 4x + 6y occurs at



(a) (0.6 , 1.6) only
(b) (3,0) only
(c) (0.6 ,1.6) and (3,0) only
(d) at every point of the line –segment joining the points (0.6 ,1.6) and (3,0)

Q13. The solution set of the inequality $3x + 5y < 4$ is
(a) an open half plane not containing the origin.
(b) an open half plane containing the origin .
(c) the whole XY – plane not containing the line $3x + 5y = 4$
(d) a closed half plane containing the origin .

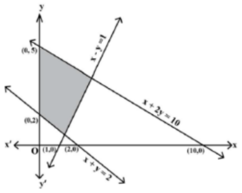
Q14. A linear programming problem (LPP) along with the graph of its constraints is shown below. The corresponding objective function is Minimize: Z = 3x + 2y ,The minimum value of the objective function is obtained at the corner point (2,0)



The optimal solution of the above LPP _____________.
(a) does not exist as the feasible region is unbounded.
(b) does not exist as the inequality $3x + 2y < 6$ does not have any point in common with the feasible region.
(c) exists as the inequality $3x + 2y > 6$ has infinitely many points in common with the feasible region.
(d) exists as the inequality $3x+ 2y < 6$ does not have any point in common with the feasible region.

Q15.The feasible region of a LPP is bounded .The corresponding objective function is Z = 6x – 7y .
The objective function attains _______________ in the feasible region .
(a) only minimum
(b) only maximum
(c) both maximum and minimum
(d) either maximum of minimum .

Q16.The feasible region corresponding to the linear constraints of a LPP is given below.



Which of the following is not a constraint to the given LPP ?

(a) $x + y \geq 2$ (b) $x + 2y \leq 10$ (c) $x - y \geq 1$ (d) $x - y \leq 1$

Q17.The corner points of the bounded feasible region determined by a system of linear constraints are (0 , 3) , (1,1) and (3,0) .Let Z = px + qy ,where p,q > 0 .The condition on p and q so that the minimum of Z occurs at (3,0) and (1,1) is

(a) p = 2q (b) p = $\frac{q}{2}$ (c) p = 3q (d) p = q

Q18. The corner points of the feasible region for the Linear Programming Problem are (0,2) , (3,0), (6,0) , (6,8) and (0,5). Let the objective function is Z = 4x + 6y then the minimum value of the objective function occurs at:

(a) (0, 2) only

(b) (3 , 0) only

(c) The mid-point on the line segment joining the points (0,2) and (3,0)

(d) Any point on the line segment joining the points (0,2) and (3,0)

Q19. The solution set of the inequation 3x + 2y > 3 is

(a) half plane containing the origin (b) half plane not containing the origin

(c) The point being on the line 3x + 2y = 3 (d) none of these

Q20. Assertion (A): The maximum value of Z = 5x + 3y, satisfying the conditions x ≥ 0, y ≥ 0 and 5x + 2y ≤ 10, is 15.

Reason (R): A feasible region may be bounded or unbounded.

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true.

Ch - 13 PROBABILITY

Q1. Assume that each born child is equally likely to be a boy or a girl. If a family has two children, what is the conditional probability that both are girls? Given that

(i) the youngest is a girl,

(ii) atleast one is a girl.

Q2. A bag contains 3 red and 7 black balls. Two balls are selected at random one-by-one without replacement. If the second selected ball happens to be red, what is the probability that the first selected ball is also red?

Q3. Of the students in a college, it is known that 60% reside in hostel and 40% are day scholars (not residing in hostel). Previous year results report that 30% of all students who reside in hostel attain A grade and 20% od day scholars attain A grade in their annual examination. At the end of the year, one student is chosen at random from the college and he has an ‘A’ grade. What is the probability that the student is a hosteler.

Q4. Let X denote the number of hours you study during a randomly selected school day. The probability that X can take the values x, has the following form, where k is some unknown constant.

$$p(X = x) = \begin{cases} 0.1\,, if\ x = 0 \\ kx\,, if\ x = 1\ or\ 2 \\ k(5 - x), if\ x = 3\ or\ 4 \\ 0\ otherwise \end{cases}$$

a. Find the value of k.
b. What is the probability that you study
(i) At least two hours?
(ii) Exactly two hours?
(iii) At most two hours?

Q5. In a factory which manufactures bolts, machines A, B and C manufacture respectively 30%, 50% and 20% of the bolts. Of their outputs, 3%, 4% and 1% respectively are defective bolts. A bolt is drawn at random from the product and is found to be defective. Find the probability that this is not manufactured by machine B.

Q6. Bag A contains 5 black and 3 red balls while bag B contains 4 black and 4 red balls. Two balls are transferred at random from bag A to bag B and then a ball is drawn from bag B at random. If the ball drawn from bag B is found to be red, find the probability that two red balls were transferred from A to B.

Q7. Of the students in a school, it is known that 30% have 100% attendance and 70% students are irregular. Previous year results report that 70% of all students who have 100% attendance attain A grade and 10% irregular students attain A grade in their annual examination. At the end of the year, one student is chosen at random from the school and he was found to have an A grade. What is the probability that the student has 100% attendance?

Q8. A bag A contains 4 black and 6 red balls and bag B contains 7 black and 3 red balls. A die is thrown. If 1 or 2 appears on it, then bag is chosen, otherwise bag. If two balls are drawn at random (without replacement) from the selected bag, find the probability of one of them being red and other black.

Q9. A and B throw a pair of dice alternatively, till one of them gets a total of 10 and wins the game. Find their respective probabilities of winning, if A starts first.

Q10. A die, whose faces marked 1, 2, 3 in red and 4, 5, 6 in green, is tossed. Let A be the event "number obtained is even" and B be the event "number obtained is red". Find if A and B are independent events.

Q11. A purse contains 3 silver and 6 copper coins and a second purse contains 4 silver and 3 copper coins. If a coin is drawn at random from one of the two purses, find the probability that it is a silver coin.

Q12. There are two bags. Bag contains 1 red and 3 white balls, and Bag II contains 3 red and 5 white balls. A bag is selected at random and a ball is drawn from it. Find the probability that the ball so drawn is red in colour.

Q13. A speaks truth in 75% of the cases, while B in 90% of the cases. In what percent of cases are they likely to contradict each other in stating the same fact? Do you think that statement of B is always true?

Q14. The probability that A hits the target is $\frac{1}{3}$ and the probability that B hits it, is $\frac{2}{5}$. If both try to hit the target independently, find the probability that the target is hit.

Q15. If P(F) = $\frac{1}{5}$ and P(E) =$\frac{1}{2}$, E and F are independent events. Find P($\overline{EUF}$).

Q16. A and B throw a pair of dice alternately. A wins the game if he gets a total of 7 and B wins the game if he gets a total of 10. If A starts the game, then find the probability that B wins.

Q17.Out of two bags ,bag A contains 2 white and 3 red balls and bag B contains 4 white and 5 red balls. One ball is drawn at random from one of the bags and is found to be red .Find the probability that it was drawn from bag B .

Q18.Out of a group of 50 people , 20 always speak the truth .Two persons are selected at random from the group (without replacement .Find the probability distribution of number of selected persons who always speak the truth .

Q19.A black and a red die are rolled together .Find the conditional probability of obtaining the sum 8 , given that the red die resulted in a number less than 4 .

Q20.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
(i) The problem is solved
(ii) exactly one of them solved the problem .