



Next

24. A diet is to contain at least 80 units of Vitamin A and 100 units of minerals. Two foods F_1 and F_2 are available. Food F_1 costs Rs. 4 per unit and F_2 costs Rs. 6 per unit. One unit of food F_1 contains 3 units of Vitamin A and 4 units of minerals. One unit of food F_2 contains 6 units of Vitamin A and 3 units of minerals. Formulate this as a linear programming problem and find graphically the minimum cost for diet that contains at least of mixture of these two foods and also write the minimal nutritional requirements.

25. Three bags contain balls as shown in the table below:

Bag	Number of White balls	Number of Black balls	Number of Red balls
I	1	2	3
II	2	3	4
III	4	3	2

A bag is chosen at random and two balls are drawn from it. They happen to be white and red. What is the probability that they came from the III bag? Or find it by using Bayes theorem.

Bag	White ball	Black ball	Red ball
I	1	2	3
II	2	3	4
III	4	3	2

26. Using matrices, solve the following system of equations:
 $2x - 3y + 4z = 11$
 $3x + 2y - 4z = 5$
 $x + y - 2z = 3$
 Verify the solution with the values from the set above:
 $2x - 3y + 4z = 11$
 $3x + 2y - 4z = 5$
 $x + y - 2z = 3$

PART B
SECTION A

27. Question numbers 1 to 6 carry 2 marks each.

- Let matrix $A = [a_{ij}]_{2 \times 2}$ such that $a_{ij} = e^{ij}$ and $a_{ji} = e^{ji}$, where a_{ij} is the element a_{ij} of the matrix $A = [a_{ij}]_{2 \times 2}$, whose elements a_{ij} are given by $a_{ij} = e^{ij}$ and $a_{ji} = e^{ji}$.
- Find the differential equation of the family of lines passing through the origin.
- Find the integrating factor for the following differential equation:
 $x \log x \frac{dy}{dx} + y = 2 \log x$
- If $\vec{a} = 2\hat{i} + \hat{j} + 3\hat{k}$ and $\vec{b} = 3\hat{i} + 2\hat{j} - 2\hat{k}$, find $|\vec{a} \times \vec{b}|$ and $|\vec{a} + \vec{b}|$.
- Find the angle between the vectors $\hat{i} - \hat{j}$ and $\hat{j} - \hat{k}$.
- Find the distance of a point $(2, 3, -1)$ from the plane $\vec{r} \cdot (2\hat{i} - 3\hat{j} + 2\hat{k}) = 4$.

15. Differentiate the following with respect to x:
 $\tan^{-1} \left(\frac{\sqrt{1+x} - \sqrt{1-x}}{\sqrt{1+x} + \sqrt{1-x}} \right)$
 Also use x to verify answers.

16. Find the equation of tangent to the curve $r = a \cos 2\theta$, at $\theta = \pi/4$.
 OR $r = a \cos 2\theta$, $r = a \cos 2\theta$ & find the equation of the normal at $\theta = \pi/4$.

17. Evaluate: $\int \frac{\sin x}{1 + \cos^2 x} dx$
 OR $\int \frac{\cos x}{1 + \sin^2 x} dx$

18. Solve the differential equation:
 $(x^2 - 1)^2 dx + 2xy^2 = 0$
 given that $x = 1$ when $y = 1$.

Solve the following differential equation:
 $\frac{dy}{dx} = \frac{(x^2 - 1)y - 11}{x^2 - 1}$, if $y = 1$ when $x = 1$.

18) گزشتہ سوال کے جوابات لکھو، (ہر سوال 2)

- (i) دو دائروں کے دو مماسی لہجے، (دو سوال)
- (ii) آٹھ گزشتہ سوال کے جوابات لکھو، (دو سوال)
- (iii) دو دائروں کے دو مماسی لہجے، (دو سوال)
- (iv) دو دائروں کے دو مماسی لہجے، (دو سوال)
- (v) دو دائروں کے دو مماسی لہجے، (دو سوال)
- (vi) دو دائروں کے دو مماسی لہجے، (دو سوال)
- (vii) دو دائروں کے دو مماسی لہجے، (دو سوال)

Section 9

19) گزشتہ سوال کے جوابات لکھو، (ہر سوال 2)

- (i) دو دائروں کے دو مماسی لہجے، (دو سوال)
- (ii) دو دائروں کے دو مماسی لہجے، (دو سوال)
- (iii) دو دائروں کے دو مماسی لہجے، (دو سوال)

20) گزشتہ سوال کے جوابات لکھو، (ہر سوال 2)

- (i) دو دائروں کے دو مماسی لہجے، (دو سوال)
- (ii) دو دائروں کے دو مماسی لہجے، (دو سوال)
- (iii) دو دائروں کے دو مماسی لہجے، (دو سوال)

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P.T.O.

1. If $|z| = a$, find the value of $|z^2|$.

$$(|z^2|)^2 = (|z|^2)^2 = (a^2)^2 = a^4$$

If $|z| = a$, then find the value of the following:

$$(|z^2|)^2 = (|z|^2)^2 = (a^2)^2 = a^4$$

2. Find the angle θ between the lines $\frac{x-2}{3} = \frac{y-2}{5} = \frac{z-1}{4}$ and the plane $3x - 2y + z - 6 = 0$.

Find the angle θ between the line $\frac{x-2}{3} = \frac{y-2}{5} = \frac{z-1}{4}$ and the plane $3x - 2y + z - 6 = 0$.

3. The vectors $\vec{a} = x\hat{i} + y\hat{j} + z\hat{k}$ and $\vec{b} = 2x\hat{i} + 3y\hat{j} + 4z\hat{k}$ are mutually perpendicular. If $|\vec{a}| = \sqrt{14}$, then find the value of xy .

The vectors $\vec{a} = x\hat{i} + y\hat{j} + z\hat{k}$ and $\vec{b} = 2x\hat{i} + 3y\hat{j} + 4z\hat{k}$ are mutually perpendicular. If $|\vec{a}| = \sqrt{14}$, then find the value of xy .

Section 10

SECTION 10

Question numbers 7 to 10 carry 4 marks each.

7. Find the value of $\int \frac{x dx}{1+x \ln x}$.

$$\int \frac{x dx}{1+x \ln x}$$

Find:

$$\int \frac{x dx}{1+x \ln x}$$

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