

- 20) In the set Q define $a * b = a + b + ab$, Then the inverse of 1 is
- a) $\frac{1}{3}$ b) $\frac{2}{3}$ c) $\frac{2}{\sqrt{3}}$ d) $\frac{\sqrt{3}}{2}$
- a) $\frac{2}{3}$ b) $\frac{-2}{3}$ c) $\frac{1}{2}$ d) $\frac{-1}{2}$

PART - II

Answer any 7 questions. Q.No. 30 is compulsory.

7×2=14

- 21) If A is symmetric, then prove that $\text{adj } A$ is also symmetric
- 22) Which one of the points i , $-2 + i$ and 3 is farthest from the origin?
- 23) If α, β, γ are the roots of the polynomial equation $ax^3 + bx^2 + cx + d = 0$, find $\sum \frac{\alpha}{\beta\gamma}$
- 24) Find the principal value of $\cot^{-1}(-\sqrt{3})$
- 25) Find the angle between the line $\vec{r} = (2\hat{i} - \hat{j} + \hat{k}) + t(\hat{i} + 2\hat{j} - 2\hat{k})$ and the plane $\vec{r} \cdot (6\hat{i} + 3\hat{j} + 2\hat{k}) = 8$
- 26) Solve $\frac{dy}{dx} = \sqrt{\frac{1-y^2}{1-x^2}}$
- 27) Find the asymptotes of the curve $f(x) = \frac{1}{x}$
- 28) In the algebraic structure, prove that the identity element is unique
- 29) Find the constant C such that $f(x) = \begin{cases} Cx^2 & 1 < x < 4 \\ 0 & \text{otherwise} \end{cases}$
- 30) Evaluate $\int_0^{\pi} \cos^7 x \, dx$

PART - III

Answer any 7 questions. Q.No. 40 is compulsory.

7×3=21

- 31) If k is real, discuss the nature of the roots of the polynomial equation $2x^2 + kx + k = 0$, in terms of k
- 32) For what value of x , the inequality $\frac{\pi}{2} < \cos^{-1}(3x - 1) < \pi$ holds?
- 33) Find the equations of tangent and normal to the parabola $x^2 + 6x + 4y + 5 = 0$ at $(1, -3)$
- 34) Solve the following system of linear equations, using matrix inversion method
 $5x + 2y = 3$, $3x + 2y = 5$
- 35) If $|z| = 3$, show that $7 \leq |z + 6 - 8i| \leq 13$
- 36) Find the angle made by the straight line $\frac{x+3}{2} = \frac{y-1}{2} = -z$ with coordinate axes.
- 37) Find the angle between the curve $y = x^2$ and $x = y^2$ at their point of intersection $(0, 0)$
- 38) Find the volume of the right circular cone of radius r and height h .
- 39) Show that $p \rightarrow q \equiv \neg p \vee q$
- 40) If $f(x, y, z) = xy + yz + zx$ find $f_x + f_y + f_z$

PART - IV

7×5=35

Answer all the questions

- 41) a) Investigate the value of λ and μ the system of linear equations.
 $x + 2y + z = 7$, $x + y + \lambda z = \mu$, $x + 3y - 5z = 5$ have
 i) no solution ii) a unique solution iii) an infinite number of solutions
 (OR)
 b) Verify (i) closure property (ii) commutative property (iii) associative property (iv) existence of identity (v) existence of inverse on the set $C = \{1, -1, i, -i\}$ where $i^2 = -1$, under usual multiplication.
- 42) a) If $z = x + iy$ and $\arg\left(\frac{z-i}{z+2}\right) = \frac{\pi}{4}$, show that $x^2 + y^2 + 3x - 3y + 2 = 0$
 (OR)
 b) A random variable x has the following probability mass function
- | | | | | | | |
|--------|-----|------|------|------|------|-------|
| x | 1 | 2 | 3 | 4 | 5 | 6 |
| $f(x)$ | k | $2k$ | $6k$ | $5k$ | $6k$ | $10k$ |
- Find (i) $P(2 < X < 6)$ (ii) $P(2 \leq X < 5)$ (iii) $P(X \leq 4)$ (iv) $P(3 < X)$
- 43) a) Solve $6x^4 - 35x^3 + 62x^2 - 35x + 6 = 0$
 (OR)
 b) Find the angle between the curve $y^2 = x$ and the curve $y = |x|$

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contains 1219 microlenses that are evenly distributed on its concave surface with a high fill factor the overall field of view of
this microlens array on curved substrates is more than 104

resolution in an imaging system with a microlens array zemax - Nov 06 2022

web c christos katopodis student 0 replies is there a way to find the resolution of a system that uses a microlens array mla for
imaging in sequential mode using the spot size airy disc or mtf doesnt seem to work with arrays i used the user defined dll
for building the mla opticstudio system analysis

exploring physical optics propagation pop in opticstudio - Jan 28 2022

web mar 31 2021 open the file zemax samples physical optics lenslet array zmx this file demonstrates the propagation of a
top hat beam through a rectangular array of spherical lenses the array is modeled on surface 2 which is defined using a

[how to use pop with lenslet arrays knowledgebase](#) - Jun 13 2023

web mar 31 2021 how to use pop with lenslet arrays march 31 2021 00 53 this article explains how to configure the physical optics propagation calculation to account for propagation through a lenslet array it also gives some useful setup information when using pop in tricky systems

microlens array zemax community - May 12 2023

web lenslet arrays are modeled using the user defined surface basically the ray trace determines which segment of the array is struck then uses the local lens curvature to determine the refraction the sample source code and dll are provided as us array c and us array dll respectively

a microlens array with different focal lengths fabricated by roll - Jan 08 2023

web zemax 1 introduction microlens arrays have been applied in many electro optical and micro optical systems such as flexible light field smart phones¹ solar concentrators² data storage³ and integral imaging 3d displays⁴ etc these microlens arrays are typically composed of microlens cells arranged in a deterministic pattern⁵ the

optimize the microlens array in hybrid nsc sc model zemax - Dec 07 2022

web i set up a hybrid model including sc source and focusing lens and nsc microlens array lenslet array 1 to generate a uniform line transversely perpendicular to beam propagation in a certain distance now i want to optimize the microlens toric and aspheric coefficient parameters to achieve the best line uniformity and smallest line width

ultrawide angle and high efficiency metalens in hexagonal arrangement - Jun 01 2022

web sep 24 2020 microlens arrays are the key component in imaging systems because the systems exhibit some excellent optical properties such as large fov angles and low aberration and distortion 6 zemax llc

single mode fiber coupling in opticstudio knowledgebase - Jul 02 2022

web mar 31 2021 zemax llc thanks dr reinhard voelkel of süss microoptics sa for the experimental data used in this article setting up the initial design this article describes a commercial fiber coupler which couples two pieces of corning smf 28e fiber using süss microoptics fc q 250 microlens arrays the manufacturers data is as follows

microlens arrays solar concentrator design using zemax - Feb 26 2022

web nov 3 2015 with optical sensor arrays tiny lens systems serve to focus and concentrate the light onto the photodiode surface instead of allowing it to fall on non photosensitive areas of the pixel device fill factor area occupied by the microlens arrays mostly the lens shape is cylindrical or spherical array size strongly depends on the applications

lens array zemax community - Mar 10 2023

web oct 16 2021 help me please to model the lens array in sequential mode i mean some lens no microlens in the same plane on the circle radius icon best answer by ray the sequential dll is quite easy to modify non sequential are more complex there are more array types available in this forum post community zemax

