

CLASS XII GUESS PAPER MATHS

TIME :3Hrs

F.M:100

General Instruction: Question 1-6(1 mark), 7-19(4 marks), 20-26 (6 marks).

SECTION -A

1. What is the smallest equivalence relation R on set $A = \{1,2,3\}$.
2. Simplify $\tan\left(\frac{1}{2}\sin^{-1}\left(\frac{2x}{1+x^2}\right)\right)$.
3. Using determinants find the value of k so that the area of the triangle with vertices (1,2),(-1,2) and (0,k) is 5 sq.unit.
4. If $A = \begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix}$, write the value of A (adj A).
5. Find the value of k so that the line $\frac{x-1}{4} = \frac{y}{-2} = \frac{z-1}{6}$ is parallel to the plane $2x-ky + 3z = 8$.
6. Find the intercept cut off by the plane $\vec{r} \cdot (3\hat{i} - \hat{j} + 3\hat{k}) = 6$ by X-axis.

SECTION -B

7. Let $A = N \times N$ and * be the binary operation on A defined by $(a,b) * (c,d) = (ac, bd)$. Whether * is commutative, associative. Find the identity element of * on A, if any.
8. Write the function $\sin^{-1}(x\sqrt{1-x} - \sqrt{x}\sqrt{1-x^2})$ in the simplest form.

OR

If $\cos^{-1}(x/2) + \cos^{-1}(y/3) = \theta$, then prove that $9x^2 - 12xy \cos \theta + 4y^2 = 36\sin^2 \theta$.

9. Using properties of determinant prove the following :

$$\begin{vmatrix} a & a+b & a+b+c \\ 2a & 3a+2b & 4a+3b+2c \\ 3a & 6a+3b & 10a+6b+3c \end{vmatrix} = a^3$$

10. Find the value of k if the function $f(x) = \begin{cases} \frac{1-\cos 4x}{8x^2} & \text{if } x \neq 0 \\ k & \text{if } x = 0 \end{cases}$ continuous at $x = 0$.

11. If $y^x = e^{y-x}$ prove that $\frac{dy}{dx} = \frac{(1+\log y)^2}{\log y}$.

OR

If $x\sqrt{1+y} + y\sqrt{1+x} = 0$ for $-1 < x < 1$ Show that $\frac{dy}{dx} = \frac{-1}{(1+x)^2}$.

12. If the radius of a sphere is measured as 8 cm with an error of 0.02 cm then find the approximate error in calculating its volume.

13. Find the point on the curve $y = x^3 - 11x + 5$ at which equation of the normal at that point is $x + y = 11$.

OR

If x, y are the two sides of two square such that $y = (x - x^2)$. Find the rate of change of area of second square with respect to the area of first square.

14. Evaluate : $\int \frac{\sin x + \cos x}{9 + 16 \sin 2x} dx$.

15. Evaluate : $\int \frac{\sin 2x}{a \cos^2 x + b \sin^2 x} dx$.

16. Evaluate : $\int_0^1 \frac{\log(1+x)}{1+x^2} dx$

OR

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

17. If $\vec{a} = 4\hat{i} + 5\hat{j} - \hat{k}$, $\vec{b} = \hat{i} - 4\hat{j} + 5\hat{k}$ & $\vec{c} = 3\hat{i} + \hat{j} - \hat{k}$ find the vector \vec{d} which is perpendicular to the both vector \vec{a} & \vec{b} and $\vec{d} \cdot \vec{c} = 21$.

18. If $\vec{a} = \hat{i} + 2\hat{j} - 3\hat{k}$, $\vec{b} = 2\hat{i} + 4\hat{j} - 5\hat{k}$ are two adjacent sides of a parallelogram, find unit vectors parallel to the diagonals of the parallelogram.

19. In a hurdle race, a player has to cross 10 hurdles. The probabilities that he will clear each hurdle is $\frac{5}{6}$. What is the probability that he will knock down fewer than 2 hurdles?

SECTION -C

20. If $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 1 & -1 \\ 1 & 3 & 1 \\ -1 & 1 & 3 \end{bmatrix}$, then find the value of AB . Use the result to solve the following system of linear equations

$$2x - y + z = -1$$

$$-x + 2y - z = 4$$

$$x - y + 2z = -3$$

21. A point on the hypotenuse of a triangle is at distance a and b from the sides of the triangle. Show that the minimum length of the hypotenuse is $\left(a^{\frac{2}{3}} + b^{\frac{2}{3}}\right)^{\frac{3}{2}}$

OR

Show that the altitude of the right circular cone of maximum volume that can be inscribed in a sphere of radius r is $\frac{4r}{3}$

22. Find the area of the smaller region bounded by the curves $x^2 + y^2 = 4$ and $y^2 = 3(2x - 1)$

23. Solve the following differential equation $(\tan^{-1} y - x)dy = (1 + y^2)dx$.

OR

Find a particular solution of the differential equation $(x - y)(dx + dy) = dx - dy$, given that $y = -1$, when $x = 0$.

24. Find the image of the line $\frac{x-1}{3} = \frac{y-3}{1} = \frac{z-4}{-5}$ in the plane $2x - y + z + 3 = 0$ as a mirror

25. A dealer wishes to purchase a number of fans and sewing machines. He has only Rs 5,760 to invest and has space for at the most 20 items. A fan cost him Rs 360 and a sewing machine cost Rs 240. He expect to sell a fan at a profit of Rs 22 and sewing machine for a profit of Rs 18. Assuming that he can sell all the items that he buys, how should he invest his money to maximize his profit? Solve it graphically.

26. If a chairman is biased so that he selects his relatives for a job 3 times as likely others. If there are 3 posts for a job, find the probability distribution for selection of persons other than their relatives. Find its Mean and Variance. If the chairman is biased, then which value of life will be demolished?

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