CLASS XII
GUESS PAPER
MATHS

Time allowed : 3 hours M.M. 100

General Instructions:

1. All questions are compulsory.
2. The question paper consists of 26 questions divided into three Section A,B, and C. Section A comprises of 6 questions of one mark each; Section B comprises of 13 questions of Four marks each; and Section C comprises of 7 questions of six marks each.

Section A

1. Find the Principal value of $sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$
2. Find a vector in the direction of vector $\vec{a} = \hat{\imath}$ - $2\hat{\jmath}$ that has magnitude 9 units.
3. If A= $\begin{bmatrix} -3 & 0 \\ 0 & -3 \end{bmatrix}$, write A^4.
4. State the reason for the relation R in the set {1,2,3} given by R= {(1,2),(2,1)} is not to be transitive.
5. Write the distance of the plane 2x-y+2z+1=0 from the origin.
6. If A is square matrix of order 3 such that |adj A|=64, find |A|.

Section B

7. Show that the relation R defined by (a,b) R(c,d) ⇒ ad= bc on the set N×N is an equivalence Relation.
8. Show that f(x) = |x-3| $\forall\, x \epsilon R$, is continuous but not differentiable at x =3.

Or

Find the value of a and b such that the function defined by

$$F(x0 = \begin{cases} 5 & if\ x \le 2 \\ ax+b & if\ 2 < x < 10 \\ 21 & if\ x \ge 10 \end{cases} \quad is\ a\ continuous\ function$$

9. Prove that $tan^{-1}1 + tan^{-1}2 + tan^{-1}3 = \pi$

Or

Solve for x: $sin^{-1}(1-x) - 2sin^{-1}x = \frac{\pi}{2}$.

10. Evaluate $\int \frac{\cos x\, dx}{(2+sinx)(3+4\sin x)}$

11. Evaluate $\int_0^{\frac{\pi}{2}} \frac{x \sin x.cosx}{sin^4 x + cos^4 x}\, dx.$

12. Using properties of determinant prove that

$$\begin{vmatrix} x+4 & 2x & 2x \\ 2x & x+4 & 2x \\ 2x & 2x & x+4 \end{vmatrix} = (5x+4)\,(4-x)^2.$$

13. If x = a$(\theta - sin\theta)$ and y = a$(1-\cos\theta)$, find $\frac{d^2y}{dx^2}$.

14. If $\vec{a} + \vec{b} + \vec{c} = 0$ and $|\vec{a}| = 3, |\vec{b}| = 5, |\vec{c}| = 7$, show that the angle between $\vec{a}\ and\ \vec{b}$ is 60^0.

15. Find the value of ω so that the lines

$\frac{1-x}{3} = \frac{7y-14}{2\omega} = \frac{z-3}{2}\ and\ \frac{7-7x}{3\omega} = \frac{y-5}{1} = \frac{6-z}{5}$ are at right angles.

Or

Find the shortest distance between the following lines

$$\frac{x-3}{1} = \frac{y-5}{-2} = \frac{z-7}{1}\ and\ \frac{x+1}{7} = \frac{y+1}{-6} = \frac{z+1}{1}$$

16. A director of selection committee is biased so that he selects his relatives for a job 2 times as likely as others. If there are 2 posts for a job, find the probability distribution for selection of his relatives.
Is the presence of such type of people in selection committee reasonable?
Which type of values will be demolished here?

17. Evalute $\int_1^2 (x^2 + 5x)dx\ as\ limit\ sums.$

18. If $x^y + y^x = a^b, find\ \frac{dy}{dx}$.

19. Using differential, find the approximate value of $(.0037)^{1/2}$.

Section 3

20. Two trusts A and b receive Rs. 70,000 and Rs. 55,000 respectively from Central Government to award prize to persons of a district in three fields agriculture, education and social service. Trust A awarded 10,5 and 15 persons in the field of agriculture, education and social service together amount to Rs. 6,000, then find the amount of each prizes by matrix method.
21. A dealer in rural area wishes to purchase a number of sewing machines. He has only Rs. 5760 to invest and has space for at most 20 items. An electronic sewing machine costs him Rs. 360.00 and a manually operated sewing machine Rs. 240.00. He can sell an electronic sewing machine at a profit of Rs. 22.00 and a manually operated sewing machine at a profit of Rs. 18.00. Assuming that he can sell all the items that he can buy. How should he invest his money in order to maximize his profit? Make it as a linear programming problem and solve it graphically.
22. Draw a rough sketch of the region enclosed between the circles $x^2 + y^2 = 4$ and $(x-2)^2 + y^2 = 1$. Using integration, find the area of the enclosed region.
23. An open box with square base is to made out of a given iron sheet of area 27 m^2. Show that the maximum volume of the box is 13.5 m^3.

Or

Prove that the volume of the largest cone that can be inscribed in a sphere of radius a is $\frac{8}{27}$ of the volume of the sphere.
24. Find the particular solution of the differential equation $x^2dy + y(x + y)dx = 0$, given that y = 1 when x = 1.
25. Find the equation of the plane passing through the line of intersection of the planes
$\vec{r}.(\hat{\imath} + \hat{\jmath} + \hat{k}) = 1 \; and \; \vec{r}.(2\hat{\imath} + 3\hat{\jmath} - \hat{k}) + 4 = 0$ and parallel to x- axis.
Or.
Find the equation of the plane passing through the point (1,1,1)*and containing the line* $\vec{r} = (-3\hat{\imath} + \hat{\jmath} + 5\hat{k}) + \lambda(3\hat{\imath} - \hat{\jmath} + 5\hat{k})$. Also, show that the plane contains the line $\vec{r} = (-\hat{\imath} + 2\hat{\jmath} + 5\hat{k}) + \lambda(\hat{\imath} - 2\hat{\jmath} - 5\hat{k})$.
26. In a village there are three mohallas A,B and C. In A, 60% persons believe in honesty, while in B 70% and in C, 80%. A person is selected at rtandom from village and found to be honest. Find the probability that he belongs to mohalla B.