Brilliant Public School

Seepat Road Bahatarai, Bilaspur (C.G.)
Pre-Board - I, 2017-18
Class – XII
Subject – Maths

Time: 3:00 Hours | M.M. – 100
Date: 04.12.2017 | Monday

General Instruction:

1. All the 4 sections are compulsory.
2. There is no overall choice however internal choice has been provided.
3. Section A consist of 4questions of one marks, section B consist of 8 questions of two marks and section C consists of 11 questions of four marks and section D of 6 questions of six marks each
4. Use of calculator is strictly prohibited.

Section-A

1. What is the cosine of the angle, which the vector makes $\sqrt{2}\hat{i}+\hat{j}+\hat{k}$ with y- axis?
2. Write the value of 'a' for which the vector $2\hat{i}-3\hat{j}+4\hat{k}$ *and* $a\hat{i}+6\hat{j}-8\hat{k}$ are collinear.
3. Write the equation of the plane which is at the distance $5\sqrt{3}$ units from the origin and the normal to which is equally inclined to co-ordinate axes.
4. Find the equation of line joining A (1, 3) and B (0, 0), using determinants.

Section- B

5. If A is a matrix of order 3×2 and B be the matrix of order 2×4. Write the order of AB and BA.
6. Rekha and surekha are two candidate seeking admission in a college. The probability of Rekha's admission is 0.7 and the probability that exactly one of them get admission is 0.6. Find the probability that Surekha gets admission.
7. An experiment succeeds twice as often as it fails. Find the probability that in the next six trials, there will be at least 4 successes.
8. Prove that : $\left[\vec{a}+\vec{b}\quad \vec{b}+\vec{c}\quad \vec{c}+\vec{a}\right]=2\left[\vec{a}\ \vec{b}\ \vec{c}\ \right]$
9. Show that the lines $\frac{x+1}{3}=\frac{y+3}{5}=\frac{z+5}{7}$; $\frac{x-2}{1}=\frac{y-4}{3}=\frac{z-6}{5}$ are intersecting lines.
10. Form the differential equation of the family of circles touching the x-axis at origin.
11. Find the general solution of differential equation $e^x \tan y\,dx+(1-e^x)\sec^2 y\,dy=0$.
12. Solve the differential equation $x\log x\frac{dy}{dx}+y=\frac{2}{x}\log x$.

Section- C

13. The function $f(x)$ is defined as follows: $f(x)=\begin{cases} x^2+ax+b & ;\ 0\le x\le 2 \\ 3x+2 & ;\quad 2\le x\le 4 \\ 2ax+5b & ;\ 4<x\le 8 \end{cases}$

    If $f(x)$ is continuous in closed interval [0,8], then find the value of 'a' and 'b'.

14. Evaluate $\int_{-\pi/2}^{\pi/2} f(x)dx$ where $f(x)=\sin|x|+\cos|x|$

15. Let L be the set of all lines in the plane and R is the relation defined as $R=\{(L_1,L_2):L_1 \parallel L_2\}$ show that R is an equivalence relation. Let L_1 represents the ideologies of Suresh's father and L_2 represents the ideologies of his mother. Their ideologies ran on parallel track to make their son honest, truthful and excellent citizen of nation. Which values are depicted by Suresh's parents?

16. If $a+b+c\neq 0$ *and* $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}=0$, then properties of determinants, prove that $a=b=c$.

17. If $x^m y^n=(x+y)^{m+n}$ then prove that $\frac{dy}{dx}=\frac{y}{x}$.

    OR If $\sin x=y\sin(x+a)$, prove that $\frac{dy}{dx}=\frac{\sin a}{\sin^2(x+a)}$

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

19. Prove that the greatest integer function defined by $f(x)=[x]$; 0<x<3 is not differentiable at x=1 and x=2.

20. Prove that $\cos^{-1}\left(\frac{4}{5}\right)+\cos^{-1}\left(\frac{12}{13}\right)=\cos^{-1}\left(\frac{33}{65}\right)$

OR

21. Find the value of the expression: $\left(2\tan^{-1}\frac{1}{3}\right)+\cos\left(\tan^{-1}2\sqrt{2}\right)$

22. There is a group of 100 people who are patriotic out of which 70 believe in non-violence. Two persons are selected at random out of them; write the probability distribution for the selected persons who are non-violent. Find the mean of the distribution. Explain the importance of non-violence in patriotism.

23. Given that vectors $\vec{a},\vec{b},\vec{c}$, form a triangle such that $\vec{a}=\vec{b}+\vec{c}$, find p, q, r, s such that area of triangle is $5\sqrt{6}$ sq units, where $\vec{a}=p\hat{i}+q\hat{j}+r\hat{k},\ \vec{b}=s\hat{i}+3\hat{j}+4\hat{k},\ \vec{c}=3\hat{i}+\hat{j}-2\hat{k}$

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

SECTION-D

25. If the lengths of the three sides of a trapezium other than base are equal to 10 cm, then find the area of trapezium when it is maximum.

26. Express $A=\begin{bmatrix} 2 & -1 & 3 \\ -5 & 3 & 1 \\ -3 & 2 & 3 \end{bmatrix}$ as the sum of symmetric and a skew-symmetric matrix. Using elementary transformation, find its inverse also.

27. Find the area of region bounded by $\{(x,y):x^2\le y\le|x|\}$

OR

Draw a rough sketch of the curve $\frac{x^2}{4}+\frac{y^2}{9}=1$ and evaluate the area of the region under the curve and above x-axis.

28. A brick manufacturer has two depots, A and B with stocks of 30,000 and 20,000 bricks respectively. He receives order from three building P, Q and R for 15,000; 20,000 and 15,000 bricks respectively. The cost of transporting bricks to the builders from depot (in Rs) is given below:

From / To	P	Q	R
A	40	20	30
B	20	60	40

How should the manufacturer fulfill the order so as to keep the cost of transportation minimum? He further decided to manufacture some bricks & give it free to construction of an orphanage. Which value of manufacturer is depicted here?

29. Show that the lines $\frac{x-a+d}{\alpha-\delta}=\frac{y-a}{\alpha}=\frac{z-a-d}{\alpha+\delta}$ and $\frac{x-b+c}{\beta-\chi}=\frac{y-b}{\beta}=\frac{z-b-c}{\beta+\chi}$ are co-planar.

30. Evaluate as limit as sum:- $\int_1^3 (x^2-x+5)dx$

= = = 0 0 0 = = =