SAMPLE QUESTION PAPER – Final Board Examination
CLASS XII - SCIENCE
MATHEMATICS

General Instructions:
Time Allowed : $2\frac{1}{2}$ hrs
Maximum Marks : 80

1. All questions are compulsory.
2. The question paper consists of 30 questions divided into five sections A, B, C, D, and E.
3. Section **A** contains **7** questions of **1** mark each , which are multiple choice type questions .Section **B** contains **7** questions of **2** marks each , Section **C** contains **7** questions of **3** marks each , Section **D** contains **7** questions of **4** marks each and section **E** contains **2** questions of **5** marks each.
4. There is no overall choice in the paper. However internal choice is provided in **2** questions of **3** marks each , **2** questions of **4** marks each and **2** question s of **5** marks each. In questions with choices only one of the choices is to be attempted.
5. Use of calculators is not permitted.

Section- A

Question numbers 1 to 7 carry 1 mark each . In each question , four options are provided , out of which one is correct. Select the correct option.

1. The differential equation $y = x\frac{dy}{d} + a\sqrt{1 + \left(\frac{dy}{d}\right)^2}$ is of

(A) order 1 , degree 2 and linear
(B) order 1 , degree 2 and non -linear
(C) order 2 , degree 1 and linear
(D) order 2 , degree 1 and non-linear

2. If a line makes angles $\frac{\pi}{3}$ and $\frac{\pi}{4}$ with x -axis and y- axis respectively then the angle made by the line with z- axis is -------

(A) $\frac{\pi}{3}$ (B) $\frac{2\pi}{3}$ (C) $\frac{\pi}{12}$ (D) $\frac{5\pi}{12}$

3. If $tan^{-1}x + tan^{-1}y = tan^{-1}\left(\frac{+y}{1- \ y}\right)$ then

(A) x y < 1 (B) x y > 1 (C) x y $\leq$ 1 (D) x y $\geq$ 1

4. The function f(x) = | $sinx$| is --------

(A) every where differential .
(B) every where continuous but not differentiable at x = n∏, n ϵ N .
(C) every where continuous but not differentiable at x = $(2n + 1)\frac{\pi}{2}$, n ϵ Z .
(D) none of these.

5. For the function y = x^3 + 21 , the value of x when y increases 75 times as fast as x , is

(A) ± 2 (B) ± 5 (C) $\pm 5\sqrt{3}$ (D) -1

6. The differential equation which represents the family of curves $y = ae^{b}$, where a and b are arbitrary constants is ----

(A) $yy^{''} = (y^{'})^2$ (B) $y^{''}y = y^{'}$ (C) $yy^{''} = y^2$ (D) $yy^{''} = (y^{'})^3$

7. The mean and the variance of a binomial distribution are 4 and $\frac{4}{3}$ then the distribution is -------

(A) $\left(\frac{1}{3}+\frac{2}{3}\right)^6$ (B) $\left(\frac{1}{3}+\frac{2}{3}\right)^4$ (C) $\left(\frac{1}{3}-\frac{2}{3}\right)^6$ (D) $\left(\frac{2}{3}+\frac{1}{3}\right)^3$

Section - B

Question numbers 8 to 14 carry 2 marks each.

8. The relation R is defined in the set A = { x: x ϵ W, 0 ≤ x ≤12 } as R = { (a,b) : a - b is divisible by 4} . Examine whether it is an equivalence relation

9. How many binary operations defined on set { 1,2} having 1 as identity and 2 as inverse of 2 are possible? Which are they?

10. If A = $\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ then find the value of $A^2 - 4A$

11. Evaluate $\int \frac{{}^4+1}{{}^2+1} dx$

12. Prove that vector addition is commutative .

13. Find the distance between the parallel planes x + y –z + 4 = 0 and x + y – z + 5 = o

14. A and B are any two events of a sample space S . If $P(A \cap B) = P(A).P(B)$ then prove that A and B are independent events.

Section - C

Question numbers 15 to 21 carry 3 marks each.

15. If $y = (sin^{-1}x)^2$, then prove that $(1-x^2)\, y_2 - xy_1 - 2 = 0$

16. Find the derivative of the function given by f(x) = $(1+x)(1+x^2)(1+x^4)(1+x^8)$ and hence find $f^{'}(1)$.

17. Find the values of a and b if the function

$$f(x) = \frac{1-sin^3}{3cos^2} \qquad , \quad x < \frac{\pi}{2}$$

$$= a \qquad , \quad x = \frac{\pi}{2}$$

$$= \frac{b(1-sinx)}{(\pi-2x)^2} \qquad , \quad x > \frac{\pi}{2}$$

is continuous at $x = \frac{\pi}{2}$.

18. Using integration prove that

$$\int \frac{1}{\sqrt{\ ^2-a^2}} dx = Log\left|x + \sqrt{x^2 - a^2}\right| + c$$

19. Solve the equation $\quad sin^{-1}\frac{5}{\ } + sin^{-1}\frac{12}{\ } = \frac{\pi}{2}$

OR

$Express \ \ costan^{-1}Sincot^{-1}x \ \ in \ the \ simplest \ form.$

20. If $\bar{p}$ *and* $\bar{q}$ are the unit vectors forming an angle of 30° then find the area of the parallelogram having $\bar{a} = \bar{p} + 2\bar{q}$ *and* $\bar{b} = 2\bar{p} + \bar{q}$ as its diagonals.

21. Two groups are competing for the position on the Board of director of a cooperation.The probability that the first and second group will win are 0.6 and 0.4 respectively . Further if the first group wins , the probability of introducing a new product is 0.7 and corresponding probability is 0.3 if the second group wins. Find the probability that the new product introduced was by the second group.

OR

The probability of solving a specific problem independently by A and B are $\frac{1}{2}$ *and* $\frac{1}{3}$ respectively . If both try to solve the problem independently , find the probability that

(i) the problem is solved.

(ii) exactly one of them solves the problem.

Section - D

Question numbers 22 to 28 carry 4 marks each.

22. Evaluate $\int \frac{2x}{(x+2)(x-3)(x+1)} dx$

23. Using integration find the area of the region $\{(x, y) : y^2 \leq 4x,\ 4x^2 + 4y^2 \leq 9\}$

24. Using matrix method ,solve the following system of equations
X +2y + z = 7 , x + 3z = 11, 2x - 3y =1

25. By using properties as far as possible , show that

$$\begin{vmatrix} b^2+c^2 & ab & ac \\ ba & c^2+a^2 & bc \\ ca & cb & a^2+b^2 \end{vmatrix} = 4a^2b^2c^2$$

OR

If A = $\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$ show that $(aI + bA)^n = a^nI + na^{n-1}bA$ for all n ϵ N,
where I is the identity matrix of order 2.

26. Prove that the lines $\frac{-2}{1} = \frac{y-4}{4} = \frac{z-6}{4}$ and $\frac{+1}{3} = \frac{y+3}{5} = \frac{z+5}{7}$
are coplanar. Also find the equation of the plane containing both these lines.

27. Solve the differential equation $(1+x^2)\ dy + 2xy\ dx = \cot x\ dx$

OR

Form the differential equation of all circles touching x - axis at the origin.

28. A dealer wishes to purchase number of fans and sewing machines. He has only Rs 57,600 to invest and has space for atmost 20 items. A fan costs him Rs 3600 and a sewing machine Rs 2400. Profit on selling a fan and a sewing machine are Rs 220 and Rs 180 respectively . Assuming that he can sell all the items that he can buy , how should he invest his money in order to maximise his profit . Formulate this problem mathematically as linear Programming problem and solve it graphically.

Section - E

Question numbers 29 to 30 carry 5 marks each.

29. Find the intervals in which the function $f(x) = x^3 - 12x^2 + 36x + 17$ is
(i) increasing (ii) decreasing .

OR

Find the point on the curve $y^2 = 4x$, which is nearest to the point (2,1).

30. Evaluate $\int (\sqrt{\tan x} + \sqrt{\cot x}\ )dx$

OR

Evaluate $\int_0^{\frac{3}{2}} |x\cos\pi x|\ dx$

E N D