



**APEEJAY SVRAN GLOBAL SCHOOL**  
**SESSION-2020-21**  
**TERM-I END EXAMINATION**  
**SUBJECT-MATHEMATICS**  
**CLASS- XII**

Name - \_\_\_\_\_

Date - \_\_\_\_\_

**M.M: 40**  
**Duration: 1 hour 30 min**

**General Instructions :**

All the questions are compulsory.

The question paper is divided in 4 sections – A , B , C , D. Section A consist of 4 questions ( MCQ ) of 1 mark each. Section B consist of 4 questions of 2 marks each. Section C consist of 4 questions of 4 marks each. Section D consist of 2 questions of 6 marks each.

Submission of rough sheet used for calculations along with answer sheets , is mandatory.

**SECTION A**

- 1) If the matrix  $A = \begin{bmatrix} 3 & 1 \\ 4 & 7 \end{bmatrix}$ , find  $A^{-1}$
- a)  $\frac{1}{17} \begin{bmatrix} 7 & -1 \\ -4 & 3 \end{bmatrix}$       b)  $\frac{1}{7} \begin{bmatrix} -5 & -1 \\ -4 & 3 \end{bmatrix}$
- c)  $\frac{1}{17} \begin{bmatrix} -7 & -1 \\ 4 & -3 \end{bmatrix}$       d)  $\frac{1}{17} \begin{bmatrix} 7 & -1 \\ -14 & 3 \end{bmatrix}$

2) Evaluate  $\int (\sqrt{x} - \frac{1}{\sqrt{x}})^2 dx$

- a)  $\frac{x^2}{2} + \log x - 2x + C$       c)  $\frac{(x-2)^2}{2} + \log x - 2x + C$
- b)  $\frac{x^2}{2} + \log x - 2x^2 + 5x + C$       d)  $\frac{x^2}{2} \log x - 2x + C$

3) Find the degree of the differential equation

$$\frac{d^2y}{dx^2} + 3\left(\frac{dy}{dx}\right)^2 = x^2 \log\left(\frac{d^2y}{dx^2}\right)$$

- a) 1      b) 2      c) 0      d) undefined

4) If  $y = \sqrt{\sin\sqrt{x}}$ , find  $\frac{dy}{dx}$ .

- a)  $\frac{\cos\sqrt{x}}{4\sqrt{x}\sqrt{\sin\sqrt{x}}}$       b)  $\frac{\cos x}{4\sqrt{x}\sqrt{\sin\sqrt{x}}}$       c)  $\frac{\cos\sqrt{x}}{4\sqrt{\sin\sqrt{x}}}$       d)  $\frac{\cos\sqrt{x}}{4\sqrt{x}\sqrt{\sin x}}$

**SECTION B**

5) Find inverse of  $\begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos\alpha & \sin\alpha \\ 0 & \sin\alpha & -\cos\alpha \end{bmatrix}$

6) Find all points of discontinuity of f where f is defined by

$$f(x) = f(x) = \begin{cases} x^{10}, & x \leq 1 \\ x^2, & x > 1 \end{cases}$$

7) If  $y = x^{x^{\dots}}$ , find  $\frac{dy}{dx}$

8)  $\int \sqrt{1 + 2 \tan x (\sec x + \tan x)} dx$

**SECTION C**

9)  $\int \frac{\sin^6 x + \cos^6 x}{\sin^2 x \cos^2 x} dx$

10) Find the equation of the tangent and normal to the curve

$$x^{\frac{2}{3}} + y^{\frac{2}{3}} = 2 \text{ at } (1, 1)$$

11) Find the local maxima / local minima , if any. Find also local

maximum / local minimum values  $g(x) = \frac{1}{x^2 + 2}$

12) Find  $A^2 - 5A + 6I$ , if  $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$

**SECTION D**

13) Draw the graph of the curve  $y = x^2 - 2x - 3$  and  $x + y = 9$  and using integration find the area between them .

14) Show that the height of a right circular cylinder of maximum volume that can be inscribed in a sphere of radius r is  $\frac{2r}{\sqrt{3}}$ . Also find the maximum volume.