

Satya Sai

SS/100

Maths-XII

2351  
Biotch

FIRST TERM EXAMINATION-2015-2016

Class-XII

Subject-Mathematics

Time : 3 Hrs.

M.M. : 100

Attempt all questions.

Do neat work.

C11 6 C12 5  
C10 1 8  
-5 3  
Adiff [ C11 | 6 C12 5  
C21 | 1 3 ]

Section A ( 1 mark each)

- Find adjoint of the matrix  $\begin{bmatrix} 3 & -1 \\ 5 & 6 \end{bmatrix}$
- What is the integrating factor for the differentiate equation  $(x \log x) \frac{dy}{dx} + y = 2 \log x$
- If  $\begin{vmatrix} x-2 & -3 \\ 3x & 2x \end{vmatrix} = 3$  find x
- Write the order of the differentiate equation  $y = px + \sqrt{a^2 p^2 + b^2}$  where  $p = dy / dx$
- Solve  $\sin^{-1} \sin \left( \frac{2\pi}{3} \right)$
- If  $xy = c^2$  find  $dy / dx$

Section B

- Evaluats  $\int_{-2}^2 |x-1|^n dx$
- To promote yoga an organization tried to generate awareness through (i) sms (ii) letters (iii) announcement. The cost for each made per attempt is (i) Rs 6 (ii) Rs 30 (iii) Rs 40. The number of attempts made in three Localitions A, B and C are as given below :



SMS

(F.V.I.R)

ANNOUNCER

	(i)	(ii)	(iii)
A	400	100	200
B	300	150	300
C	500	200	100

$$\begin{bmatrix} 6 \\ 30 \\ 40 \end{bmatrix}$$

3x3    3x1    3x1

Find cost incurred by the organisation for three Localities separately, using matrices. Write two lines about benefit of yoga.

9. Solve for x,  $\tan^{-1} \left( \frac{1-x}{1+x} \right) = \frac{1}{2} \tan^{-1} x, x > 0$

10. Differentiate  $\sin^2 x$  with respect to  $e^{\cos x}$

11. If  $y = (x + \sqrt{x^2 - 1})^m$  prove that

$(x^2 - 1)y_2 + xy_1 - m^2y = 0$

Handwritten solution for Q11:

$$dy = m(x + \sqrt{x^2 - 1})^{m-1} \left( 1 + \frac{x}{\sqrt{x^2 - 1}} \right)$$

$$\sqrt{x^2 - 1} dy_1 = m(x + \sqrt{x^2 - 1})^{m-1} (\sqrt{x^2 - 1} + x)$$

$$\sqrt{x^2 - 1} y_2 + \frac{y x}{x^2 - 1} = m(x + \sqrt{x^2 - 1})^{m-1} (\sqrt{x^2 - 1} + x)$$

$$(x^2 - 1)y_2 + xy_1 = m(x + \sqrt{x^2 - 1})^{m-1} (\sqrt{x^2 - 1} + x)$$

12. Evaluate  $\int_2^5 \frac{\sqrt{x} dx}{\sqrt{x} + \sqrt{7-x}}$

13. Evaluate  $\int \frac{e^x dx}{\sqrt{5 - 4e^x - e^{2x}}}$

14. Write simplest form  $\cos^{-1} \left( \frac{3 \cos x - 4 \sin x}{5} \right)$

15. Find the intervals in which function

$f(x) = 2x^3 - 15x^2 + 36x + 1$  is strictly increasing or decreasing. Also find the points at which the tangents are parallel to x axis.

16. Find the area of the region enclosed by the parabola  $x^2 = y, y = x + 2$  and x axis.

17. Solve differentiate equation.

$e^x \tan y dx + (1 - e^x) \sec^2 y dy = 0.$

18. If  $A = \begin{bmatrix} 3 & 2 \\ 2 & 5 \end{bmatrix} B = \begin{bmatrix} 2 & 1 \\ -4 & 0 \end{bmatrix}$  then find  $(AB)^{-1}$

19. Using differentials, find the approximate value of  $(49.5)^{\frac{1}{2}}$

Handwritten calculations for Q18 and Q19:

$$\begin{array}{r} 21 \\ +2 \\ \hline 23 \end{array} \quad \begin{array}{r} -15 \\ 49 \\ \hline -135 \end{array} \quad \begin{array}{r} 36 \\ +3 \\ \hline 108 \\ 54 \\ \hline 163 \\ 135 \\ \hline 28 \end{array}$$

$$1 + \frac{1}{2\sqrt{x-1}}$$

$$\frac{1-x}{1+x}$$



Section C (6 marks each)

20. Solve differential equation.

$$[x \sin^2(y/x) - y] dx + x dy = 0 \text{ if } x = 1, y = \pi/4$$

21. Using the method of intergration, find the area of triangle ABC, coordination of whose vertices are A (2,0), B (4,5), C (6,3).

22. Evaluate  $\int_0^1 (x^2 + 1 + e^{2-3x}) dx$  as a limit of a sum.

23. Using the proportion of determinant, prove the following

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

24. Show that a cylinder of a given volume which is open at the top has minimum total surface area when its height is equal to the radius os its base.

25. If  $x = a \cos \theta + b \sin \theta$  Find  $\frac{d^2y}{dx^2}$

$$y = a \sin \theta - b \cos \theta$$

and show that  $y^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + y = 0$

26. 10 students were selected from a school on the basis of values for giving awards and were divided in to three groups. The first group comprises hand workers. The second has honest and low abiding students and third group. contains vigilant are obedient students. Double the number of students of the first group added to the number in the second group gives 13. While the combined strength of first and second group is four times that of third group. Apart from the values, hard work, honesty and respect for low, vigilance and obedience, suggest one more value, which in your opinion, the school consider for awards.



1  
13  
x 5  
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65

Handwritten notes and diagrams for question 24. Includes a diagram of a cylinder with radius 'r' and height 'h'. Calculations show surface area  $S = 2\pi r^2 + 2\pi rh$  and volume  $V = \pi r^2 h$ . The derivation shows that for minimum surface area,  $h = r$ .