

[This question paper contains 2 printed pages.]

Sr. No. of Question Paper : 5247

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Your Roll No.....

Unique Paper Code : 290579

Name of the Paper : MTSS : Mathematics for Social Sciences – I

Name of the Course : B.A. (Prog.) III (Application Course)

Semester : V

Duration : 2 Hours

Maximum Marks : 55

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question No. 1 is compulsory and carries 15 marks.
3. Attempt 4 more questions selecting at least 1 question from each section, Each question carries 10 marks.

1. (i) Find $\lim_{x \rightarrow 0} \frac{x}{\sqrt{x+1}-1}$.

(ii) Find $\int_0^1 \frac{x^2}{\sqrt{1+x^3}} dx$.

(iii) Find $\frac{dy}{dx}$ if $y = (4x^2 - 1)(7x^3 + x)$.

(iv) Examine the continuity of the function :

$$f(x) = \begin{cases} 2+x, & \text{if } x \leq 1 \\ 2-x, & \text{if } x > 1 \end{cases}$$

at $x = 1$.

(v) Find an equation for the circle with centre $(1, -2)$ that passes through $(4, 2)$.

SECTION – 1

2. (i) A firm determines that x units of its product can be sold daily at Rs. p per unit, where $x = 1000 - p$.

Find

(a) Revenue function $R(x)$

(b) Marginal revenue function $MR(x)$

P.T.O.

(ii) Evaluate

$$\int x^2 e^{x^3} dx$$

3. (i) Sketch the graph of

$$36x^2 + 4y^2 = 144$$

(ii) If $\log(xy) = x^2 + y^2$

Find dy/dx

SECTION - 2

4. (i) Evaluate $\int_2^8 |x-5| dx$.

(ii) Find the inflection points for the function $f(x) = 3x^5 - 5x^3 + 2$.

5. (i) Determine where the function $f(x) = x^4 - 4x^3 + 10$ is increasing, where it is decreasing, where its graph is concave up and where its graph is concave down.

(ii) The Cost function of a company is $c(x) = x^3 - 6x^2 + 15x$. Find the average cost. Is there a production level that minimizes average cost? What is this minimum?

SECTION - 3

6. (i) Write down the Taylor's series expansion for $\sin x$ and compute $\sin(0.1)$ to three places of decimals.

(ii) Find $\frac{dy}{dx}$, if $x^y + y^x = a^b$

7. (i) Test the convergence of the series $\sum_{n=1}^{\infty} \frac{1}{n(n+2)}$.

(ii) Verify Mean value theorem for the function $f(x) = x^2 - 4x - 3$ in $[1, 4]$.