

**FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, OCTOBER 2012**

(CCSS)

Mathematics

MM 5D 03—MATHEMATICS FOR SOCIAL SCIENCES

Three Hours

Maximum : 30 Weightage

**Unit I**

*Answer all twelve questions.*

The equation of the Y-axis is \_\_\_\_\_.

The slope of the line  $y = 3x + 2$  is \_\_\_\_\_.

The x-intercept of the line  $y = 6x - 54$  is \_\_\_\_\_.

If  $f(x) = 5x + 3$  ;  $g(x) = 4x - 8$  then  $(f + g)(x)$  is \_\_\_\_\_.

One solution of  $x^2 + 6x = 0$  is \_\_\_\_\_.

Value of  $\lim_{x \rightarrow 3} \frac{4x^2 - 9x}{x + 7}$  is \_\_\_\_\_.

The domain of the function  $f(x) = \frac{4}{\sqrt{x}}$  is \_\_\_\_\_.

If  $y = 5x^2 + 7x + 12$ , then  $\frac{dy}{dx}$  is \_\_\_\_\_.

Value  $\ln e^x$  is \_\_\_\_\_.

If  $y = 3x$ , then  $\frac{d^2y}{dx^2}$  is \_\_\_\_\_.

If  $z = xy$ , then  $\frac{\partial z}{\partial x}$  is \_\_\_\_\_.

Value of  $\int x^2 dx$  is \_\_\_\_\_.

(12 × ¼ = 3 weightage)

**Unit II**

*Answer all nine questions.*

Solve algebraically  $-5x + y = -8$  and  $6x - y = 11$ .

An author receives a fee of Rs. 5,000 plus Rs. 7.00 for every book sold. Express his revenue R as a function of number of books x sold.

Turn over

15. Evaluate :  $\text{Lt}_{x \rightarrow 16} \frac{\sqrt{x} - 4}{x - 16}$ .
16. Find  $\frac{dy}{dx}$  if  $y = (x^2 + x)^3$ .
17. Determine whether  $f(x) = 3x^2 - 5$  is increasing or decreasing at  $x = 3$ .
18. Simplify  $y = \log_2 \left( \frac{1}{16} \right)$ .
19. Find the slope of the tangent to the curve  $y = x^2 + 1$  at  $(1, 2)$ .
20. Evaluate :  $\int_1^2 x \, dx$ .
21. Find the marginal revenue, given the supply function  $P = Q^2 + 4Q + 9$ .

(9 × 1 = 9 weight)

### Unit III

Answer any five questions.

22. Find the equation of a line passing through  $(-8, 2)$  and having slope  $m = 3$ .
23. Solve by completing the square :  
 $-x^2 + 8x + 20 = 0$ .
24. Graph the functions  $f(x) = 5 - x^2$ . Also identify vertex and axis.
25. Find the break-even for a firm operating on monopolistic competition, given that total revenue  $R = 48x - x^2$  and total cost is  $TC = 6x + 120$ .
26. Given the average cost function :

$$A = 6Q + 9 + \frac{120}{Q}. \text{ Find the Marginal cost function.}$$

27. How many years will it take a sum of money  $P$  to double at 8% interest compounded annually?
28. Use implicit differentiation to find  $\frac{dy}{dx}$ , given  $8x^3 - y^2 = 45$ .

(5 × 2 = 10 weight)

### Unit IV

Answer any two questions.

29. (a) Given  $y = \frac{7x^3}{4n+9}$ . Find  $\frac{dy}{dx}$ .
- (b) Find  $\frac{\partial^2 z}{\partial x^2}$  and  $\frac{\partial^2 z}{\partial y^2}$  if  $z = 6x^3y^5$ .

Find the level of output at which the profit  $\pi$  is maximum, when total Revenue is  $R = 600Q - 5Q^2$  and total cost is  $C = 320 + 20Q$ .

(a) Evaluate :  $\int 3x^2(x^3 + 7)^2 dx$ .

(b) Find the effective rate of interest for  $P = \text{Rs. } 2000$  at  $r = 6\%$  when compounded semi-annually.  
(2 × 4 = 8 weightage)