

Reg. No. :

Name :

V Semester B.A./B.Sc./B.Com./B.B.A./B.B.A.T.T.M./B.B.M./B.C.A./B.S.W./
B.A. Afsal-UI-Ulama Degree (CCSS-Reg./Supple./Improv.)

Examination, November 2013

(Open Course)

5D01 MAT : BUSINESS MATHEMATICS

Time : 2 Hours

Max. Weightage : 20

Instruction : Answer all questions.

PART – A

This Part consist of **two** bunches of question carrying equal weightage of **one**. Each bunch consists of **four** objective type of questions. Answer **all** questions.

I. 1) The function $y = |x|$ is called the _____ function.

2) $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = \underline{\hspace{2cm}}$

3) If u and v are any functions of x , then $\frac{d}{dx} (u/v) = \underline{\hspace{2cm}}$ 4) For points of local maximum $\frac{dy}{dx} = 0$ and $\frac{d^2y}{dx^2} \underline{\hspace{2cm}}$ (W – 1)

II. 5) $\int \frac{du}{dx} = \underline{\hspace{2cm}}$

6) $\int \log x \, dx = \underline{\hspace{2cm}}$

7) $\int (\text{Marginal cost}) \, dx \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$

8) If P is the principal amount, and if the compounding done in times in a year and the rate of interest is $r\%$ p.a. then interest for n years = _____ (W – 1)



PART - B

Answer **any six** questions in **one** or **two** sentences **each**. Each question carries a weightage of **one**.

9) Evaluate the limit $\lim_{x \rightarrow \frac{1}{3}} \frac{9x^2 - 1}{3x - 1}$

10) Prove that the function $f(x) = \frac{|x|}{x}$ is discontinuous at $x = 0$.

11) Differentiate with respect to x , $5x^4 + 3x^3 - 7x^2 + 9x - 100$.

12) Find $\frac{dy}{dx}$ if $y = x^n e^{ax}$.

13) Evaluate $\int \frac{x^4 + 3x^2 + 1}{x^3} dx$.

14) Find $\int \frac{\sqrt{1 + \log x}}{x} dx$.

15) If the demand function is $p = 16 - x^2$ find consumer surplus at $x = 3$.

16) The supply function of a product is $y = 3x^2 + 6$. Find the producer's supply when 10 units are supplied.

17) Calculate the nominal rate of interest convertible half yearly when the effective rate is 6% p.a.

18) Calculate the market equilibrium value for an acre of land yielding Rs.100 p.a. after all expenses, indefinitely into the future. The market rate of interest is 10% p.a.

(W - 6×1=6)

PART - C

Answer **any four** questions. Each carries a Wt 2.

19) Evaluate $\lim_{x \rightarrow 0} \frac{a^x - b^x}{x}$.

20) A function $f(x)$ is defined as follows

$$f(x) = \begin{cases} \frac{9x}{x+2} & \text{if } x < 1 \\ 3 & \text{if } x = 1 \\ \frac{x+3}{x} & \text{if } x > 1 \end{cases}$$

Examine the continuity in the interval $(-3, 3)$.



21) If $y = x^{e^{-x^2}}$ find $\frac{dy}{dx}$.

22) If $y = x^3 \log \left(\frac{1}{x}\right)$ prove that $x \frac{d^2y}{dx^2} - 2 \frac{dy}{dx} + 3x^2 = 0$.

23) A firm has revenue function given by $R = 8D$ where R is the gross revenue and D is quantity sold and production cost function is given by

$$C = 1,50,000 + 60 \left(\frac{D}{900}\right)^2.$$

Find the total profit function and the number of units to be sold to get the maximum profit.

24) If $f'(x) = 3x^2 + 2$ and $f(0) = 0$, find $f(2)$.

25) Find the total revenue between 0 to 10 units of output (x) from the marginal revenue given by $MR = 3 \left(\frac{x^2}{20}\right) - 10x + 100$.

26) Calculate the present value of an annuity of Rs. 30,000 per annum assumed to be payable continuously for 10 years at the rate of interest 8% p.a. compounded continuously. (W - 4x2=8)

PART - D

Answer **any one**. Wt 4 :

27) Determine consumer surplus and producer surplus under pure competition for the demand function $p = 36 - x^2$ and supply function $p = 6 + \frac{x^2}{4}$ where p is price and x is quantity.

28) A company has a demand curve given by the function $2Q + 3P = 160$. The average cost curve of the form is given by the relation $AC = 3Q^2 - 18Q + 63 + \frac{5}{Q}$.

Find the level of output which

- i) Maximize total revenue
- ii) minimizes marginal cost

29) If $y = \left[x + \sqrt{1+x^2}\right]^n$ show that $(1+x^2) \frac{d^2y}{dx^2} + x \frac{dy}{dx} - n^2y = 0$. (W - 1x4=4)