

Reg. No. : .....

Name : .....

Third Semester B.A. Degree Examination, March 2022

First Degree Programme under CBCSS

Mathematics

Complementary Course for Economics

MM 1331.5 : MATHEMATICS FOR ECONOMICS – III

(2013 – 2018 Admission)

Time : 3 Hours

Max. Marks : 80

PART – A

Answer all the ten questions. Each question carries 1 mark.

1. Evaluate the integral  $\int x^3 dx$ .
2. Evaluate the integral  $\int \frac{1}{x} dx$ .
3. Evaluate the integral  $\int e^{x+3} dx$ .
4. What is  $f(x)$  if  $f'(x) = \cos x$ ?
5. Write an anti derivative of  $f(x) = \frac{-1}{x^2}$ .
6. Write Taylor's series of function  $f$  at a point  $c$ .
7. Find the sum of the geometric series  $\sum_{n=1}^{\infty} \frac{(-1)^{n-1} 5}{4^{n-1}}$ .

8. Write the geometric series with  $a = 1/4$  and  $r = 1/5$ .
9. Determine whether the series  $1 + \frac{1}{2} + \left(\frac{1}{2}\right)^2 + \left(\frac{1}{2}\right)^3 + \dots$  is convergent or divergent.
10. Write the Maclaurin series expansion of  $\sin x$ .

(10 × 1 = 10 Marks)

### PART – B

Answer **any eight** questions from among questions **11 to 22**. Each question carries **2** marks.

11. Evaluate the Integral  $\int \frac{x}{x^2 + 1} dx$ .
12. Evaluate the integral by substitution  $\int (x^3 + 10)^{50} 3x^2 dx$ .
13. Evaluate  $\int_0^5 \sqrt{4x+1} dx$ .
14. If  $f(x) = f'(x)$ , What is  $f(x)$ ?
15. Find  $\frac{d}{dx} \int_0^x \frac{1}{1+t^2} dt$ .
16. Find the area under the straight line  $y = x$  above the  $x$ -axis between the co-ordinates  $x = 0$  and  $x = 1$ .
17. If the marginal cost  $f'(x) = 2 + x + x^2$  and  $f(0) = 50$ , find the total cost function?
18. Write the Simpson's rule to approximate  $\int_a^b f(x) dx$ .
19. If the marginal revenue function is  $p_m = \frac{a}{\sqrt{ax+b}}$  and if the cost of zero output is zero, find the total cost as a function of  $x$ .

20. Find the Maclaurin series for  $f(x) = e^x$ .
21. Expand  $(1+x)^{\frac{1}{2}}$ ,  $|x| < 1$ .
22. Find the binomial series for the function  $(1+x)^5$ ,  $|x| < 1$ .

(8 × 2 = 16 Marks)

PART – C

Answer any six question from the questions 23 to 31. Each question carries 4 marks.

23. Express the number  $\overline{3.214} = 3.2141414\dots$  as a rational number.
24. Show that the accumulated value of a constant income stream  $a$  will be  $\frac{a}{r}(e^{rx} - 1)$ .
25. Using integration by parts, evaluate  $\int x^3 e^{-x} dx$ .
26. Evaluate
- (a)  $\int_{-1}^1 ex^2 \sqrt{x^3 + 1} dx$
- (b)  $\int_{\frac{\pi}{4}}^0 \tan x \sec^2 x dx$ .
27. Use the trapezoidal rule with  $n = 4$  to estimate  $\int_1^2 x^2 dx$ .
28. Evaluate the integral  $\int_0^1 \frac{dx}{1+x}$ . Use Simpson's rule to find an approximate value of  $\ln 2$ .

29. Find the Maclaurin series for  $\cos 2x$ .
30. Find a series expansion for  $\tan^{-1} x$ ,  $-1 \leq x \leq 1$ .
31. Find the Taylor series generated by  $f(x) = 1/x$  at  $a = 2$ .

(6 × 4 = 24 Marks)

PART – D

Answer **any two** question from the questions **32 to 35**. Each question carries **15** marks. –

32. Evaluate

(a)  $\int a^{2x+3} dx$

(b)  $\int_3^5 \frac{dx}{\sqrt{x-3}}$

(c)  $\int x e^{-x^2} dx$

33. Use Simpson's rule with

(a)  $n = 6$  to approximate  $\int_1^2 \frac{dx}{x+1}$

(b)  $n = 4$  to approximate  $\int_0^1 5x^4 dx$

34. Explain Domar's model of public debt and national income.

35. (a) Find the series for  $f'(x)$  and  $f''(x)$  of  $f(x) = 1/(1-x)$ ,  $|x| < 1$ .

(b) Expand  $\ln(1+x)$  about  $x = 0$ .

(2 × 15 = 30 Marks)