

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 $\sum_{n=1}^{\infty} \frac{(-1)^{n-1} 5}{4^{n-1}}$.

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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 $3.\overline{214} = 3.2141414\dots$ 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 $\int x^3 e^{2x} dx$.
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 $\int_0^2 \frac{dx}{\sqrt{x+1}}$

(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)