

SECTION – IV

Answer any **two** questions. These questions carry **15** marks each.

32. (a) What is $f(x)$, if $f'(x) = \frac{4x^3 - 2xe^{x^2}}{x^4 - e^{x^2}}$?

(b) Evaluate $\int_2^3 \frac{3}{x \log x} dx$.

(c) Evaluate $\int \left(\frac{1}{\sqrt{3x+4}} + \frac{3}{x^4} \right) dx$.

33. Evaluate $\int_0^1 \frac{dx}{1+x}$ using Simpson's rule and Trapezoidal Rule by dividing the interval into four equal parts.

34. Express the number 3.2141414... as rational number.

35. Show that the Taylor's series expansion of $\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \dots$

(2 × 15 = 30 Marks)

(Pages : 4)

S – 3400

Reg. No. :

Name :

Third Semester B.A. Degree Examination, February 2024

First Degree Programme under CBCSS

Mathematics

Complementary Course for Economics

MM 1331.5 : MATHEMATICS FOR ECONOMICS – III

(2013-2020 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – I

All the first **ten** questions are compulsory. They carry **1** mark each.

1. If $\int_1^5 f(x) dx = 10$, then $\int_5^1 f(x) dx = \dots$

2. If $\int_a^b f(x) dx = 3$, then $\int_a^b 5f(x) dx = \dots$

3. Evaluate $\int e^x dx$.

4. What is $f(x)$, if $f'(x) = x^3$?

5. Evaluate $\int (x^2 + 3x - 2) dx$.

6. Find the sum of the series $1 + \frac{1}{10} + \frac{1}{100} + \frac{1}{1000} + \dots$

7. "There exists a series which is both convergent and divergent". Determine whether the statement is True or False.
8. Determine whether the series $1+3+5+\dots$ is convergent.
9. $1+\frac{1}{2}+\frac{1}{6}+\frac{1}{24}+\dots=\dots$
10. Write $\log(1+x)$ as an infinite series.

(10 × 1 = 10 Marks)

SECTION – II

Answer any **eight** questions. These questions carry **2** marks each.

11. If $\int_{-1}^4 f(x)dx = 1$ and $\int_{-1}^2 f(x)dx = 5$ then $\int_2^4 f(x)dx = \dots$
12. Evaluate $\int \left(2\sqrt{x} + \frac{1}{x}\right) dx$.
13. Evaluate $\int \left(\frac{x^5 - x^3 + 1}{x}\right) dx$.
14. Evaluate $\int \left(\frac{e^{2x} + x + 1}{e^{2x} + x^2 + 2x}\right) dx$.
15. Evaluate $\int \frac{1}{x} (\log x + 2)^3 dx$.
16. Write the Trapezoidal Rule.
17. Illustrate capital value as an integral.
18. If the marginal revenue function is $R'(x) = 0.01x^2 + 2x$, find total revenue function.
19. Distinguish between convergent and divergent series.

20. Determine whether the series $1+2+2^2+2^3+\dots$ is convergent.
21. Find the sum of the series $1+2+3+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\dots$
22. Explain Taylor's series.

(8 × 2 = 16 Marks)

SECTION – III

Answer any **six** questions. These questions carry **4** marks each.

23. Evaluate $\int \left(\frac{e^x + \frac{1}{x} + \cos x}{e^x + \log x + \sin x}\right) dx$.
24. Evaluate $\int x e^{x^2} dx$.
25. Evaluate $\int \frac{x dx}{\sqrt{x^2 - 1}}$.
26. Evaluate $\int_2^3 \left(\frac{e^x}{e^{3x} + 1} + (1+x)^5\right) dx$.
27. Evaluate $\int \frac{1}{x^2 - 1} dx$.
28. Prove that an infinite arithmetic series is not convergent.
29. Using Taylor's series find an approximate value of $\log 1.1$ correct to four decimal places.
30. Explain the remainder function $R_n(x)$.
31. Find the Taylor's series expansion of e^x .

(6 × 4 = 24 Marks)