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K – 2325

Reg. No. :

Name :

Third Semester B.A. Degree Examination, March 2021

First Degree Programme under CBCSS

Mathematics

Complementary Course for Economics

MM 1331.5 MATHEMATICS FOR ECONOMICS – III

(2019 Admission Regular)

Time : 3 Hours

Max. Marks : 80

PART – A

Answer all questions. Each question carries 1 marks.

1. Evaluate $\int x^{10} dx$.
2. Find the value of $\int_0^2 x(x+2) dx$.
3. Define marginal cost function if the total cost is given as $f(x)$.
4. Define Discounting.
5. Give the equation for Y_t , the income at time t , if Y_t grows continuously at a constant rate r .
6. Define a series.
7. Define the convergence of a series.

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8. Give the sum to n terms of the series, $a + ar + ar^2 + \dots$.
9. What can we say about the general term of a convergent series?
10. Give the Taylor series for $f(x) = ax^2 + bx + c$ about $x = 0$.

PART – B

Answer **any eight** questions. Each question carries 2 marks.

11. Evaluate $\int_0^{2\pi} \cos 2x \, dx$.
12. Find the value of $\int \frac{x^3 - 2x}{x} \, dx$
13. What is the integral of $\sec x$?
14. Define an even function and evaluate $\int_{-a}^a f(x) \, dx$ for an even function.
15. If $\int_0^1 2f(x) \, dx = 2$ and $\int_1^3 f(x) \, dx = \frac{1}{2}$, evaluate $\int_0^3 f(x) \, dx$.
16. $\int_0^5 (x^2 + x) \, dx = a$ and $\int_0^5 (x^2 - x) \, dx = b$, find $\int_0^5 x^2 \, dx$.
17. State the generalised Exponential Law.
18. Find the total cost if the marginal cost is $2 + \frac{5}{x}$.
19. Write the series with sum up to n terms is $\frac{n}{n+1}$.
20. Find the multiplier in Economics for income propagation process if the marginal propensity to consume, $\alpha = 0.8$.
21. Show that $\frac{1}{9}$ can be expressed as the sum of a series with first term, $\frac{1}{10}$.

22. State the binomial series.
23. What is the Taylor Series for the function $f(x)$ about a point a .
24. Express e as a series.
25. Give the Maclaurin's series expansion for $f(x)$.
26. State the Taylors Theorem for several variables.

PART – C

Answer **any six** questions. Each question carries **4** marks.

27. Integrate $\frac{1}{x(x^5 + 1)}$.
28. State integration by parts and evaluate $\int x \sec^2 x \, dx$.
29. Derive the present value of capital assuming that $y_t = y$, a constant, using $c = y_t e^{-rt} \, dt$.
30. Find the total cost if the marginal cost is $3 + 8x + 15x^2$ and $f(0) = 10$.
31. Define the term Capitalization.
32. State the Simpsons Rule for approximate integration.
33. Evaluate $\frac{1}{2} + \frac{1}{4} + \dots + \frac{1}{2n}$.
34. Using the series for $\frac{1}{1-x}$, expand $\frac{30}{29}$ and find its value up to 4 decimals.
35. Write the series for e^x and e^{-x} and using $\cos x = \frac{(e^x + e^{-x})}{2}$, find the series for $\cos x$.

36. State the exponential series and evaluate $1 + 2x + \frac{4x^2}{2!} + \frac{8x^3}{3!} + \dots$ at $x = 1$.
37. Write the Taylor series for $f(x) = 5 + 3x + 8x^2$.
38. Express $\sqrt{1+x}$ as a series.

PART – D

Answer **any two** questions. Each question carries **15** marks.

39. Evaluate :
- (a) $\int x^2 e^x dx$
- (b) $\int \frac{2x+3}{(2x+1)(1-3x)} dx$.
40. State Trapezoidal rule of approximation and find the approximate value of $\log 2 = \int_0^1 \frac{dx}{1+x}$.
41. Explain Domars' Model of Public Debt and National Income. Also prove that $\lim_{t \rightarrow \infty} \frac{D_t}{Y_t} = \frac{\alpha}{r}$.
42. Derive the Taylor Series for e^{x+h} , $\ln(1+x)$ and $\ln \cos(x+h)$.
43. Using Taylor method, derive the series for
- (a) e^x about $x = 1$ and for
- (b) $\sin x$ about $x = \frac{\pi}{2}$.
44. Find the Taylor series expansion of (a) $(1+x)^n$ (b) $\frac{1}{1-x}$.