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K – 2194

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

(2013, 2015-2018 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – I

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

1. Find the anti derivative of e^{2x} .
2. If $\frac{d}{dx}f(x) = 4x^3 - \frac{3}{x^4}$, then what is $f(x)$?
3. Find $\int \sqrt{ax+b} \, dx$.
4. Evaluate $\int_0^1 \frac{dx}{x+4}$.
5. If $\int_{-2}^3 f(x)dx = 7$ and $\int_{-2}^0 f(x)dx = -9$ then what is $\int_0^3 f(x)dx$?

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6. If $f(x)$ is an even function, what is the relation connecting $\int_{-a}^a f(x) dx$ and $\int_0^a f(x) dx$?
7. If the present population is a and it doubles every year, then what is the population after n years.
8. Find the sum of the series $1 + \frac{1}{4} + \frac{1}{16} + \frac{1}{64} + \dots$
9. When can we say that a series is convergent?
10. If the n^{th} term of a series is $\frac{n}{n^2 + 1}$, Write the series.

SECTION – II

Answer **any eight** questions from among the questions **11 to 22**. These questions carry **2** marks each.

11. Sketch the area represented by $y = 3$ above the x -axis and between $x = 4$ and $x = 6$ and evaluate it.
12. Evaluate $\int x^3 \sqrt{x^4 - 2} dx$.
13. Evaluate (a) $\int \frac{2x - 2}{x^2 - 2x + 7} dx$ (b) $\int \frac{\log x}{x} dx$.
14. Find $\int_0^2 x \sqrt{x + 2} dx$.
15. The marginal cost function is $f'(x) = 10 - 2x$, find the total cost of $f(0) = 30$.

16. If Y is the constant stream of yield and γ is the rate of interest, prove that the capitalization is $\frac{Y}{\gamma}$.
17. Expand $(1-x)^{-2}$.
18. Find the Maclaurin's series for $\sin x$.
19. The sum of n terms of a series is $\frac{6n^3 + 5n^4}{n^4 + n + 2}$. Find the sum to infinity of the series.
20. Sum the series $\sum_{n=1}^{\infty} \frac{n^2}{(n+1)!}$.
21. Show that $\log 2 - \frac{1}{2!}(\log 2)^2 + \frac{1}{3!}(\log 2)^3 - \dots = \frac{1}{2}$.
22. Prove that $\frac{1}{1.2} + \frac{1}{3.4} + \frac{1}{5.6} + \dots = \log 2$.

SECTION – III

Answer **any six** questions from among the questions **23 to 31**. These questions carry **4** marks each.

23. Evaluate $\int \frac{5x-5}{x^2-5x+6} dx$.
24. Find $\int e^x \sin x dx$.
25. Evaluate $\int_0^1 \int_x^{x^2} (x+2) dy dx$.
26. Find the demand curve if the elasticity of demand curve is $x = a - bp$, where a and b are constants.

27. Find the coefficient of x^n in the expansion of $\sum_{n=0}^{\infty} \frac{(-1)^n (a + bx)^n}{n!}$.
28. Show that $1 + \frac{1+2}{2!} + \frac{1+2+2^2}{3!} + \frac{1+2+2^2+2^3}{4!} + \dots = e^2 - e$.
29. Show that $\log\left(\frac{n+1}{n}\right) = 2\left(\frac{1}{2n+1} + \frac{1}{3(2n+1)^3} + \frac{1}{5(2n+1)^5} + \dots\right)$.
30. Sum the series $1 + 2 \cdot \frac{1}{6} + \frac{2.5}{2!} \frac{1}{6^2} + \frac{2.5.8}{3!} \frac{1}{6^3} + \dots$
31. Find the fraction corresponding to the repeating decimal 0.252525... by expressing it as an infinite geometric series.

SECTION – IV

Answer **any two** questions from among the questions **32 to 35**. These questions carry **15** marks each.

32. Explain Domar's model of public debt and national income. Prove with usual notations that the ratio of debt to income approaches $\frac{a}{\gamma}$.
33. Evaluate using Simpson's rule $\int_0^1 \frac{dx}{1+x}$ taking $n = 8$ intervals.
34. Evaluate using trapezoidal rule $\int_1^2 \frac{dx}{x}$ by taking 5 intervals.
35. Expand $\frac{e^x}{\cos x}$ using Macluarin's series.