C 62623 (Pages : 3) Name..................................

Reg. No..............

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, MAY 2019

(CUCBCSS-UG)

Mathematics

MAT 2C 02—MATHEMATICS

Time : Three Hours Maximum : 80 Marks

Part A (Objective Types)

Answer all twelve *questions.*

I. Define a sequence.

2. Fill in the blanks • $\frac{d}{dx} \cosh^{3}(3x) =$ ____________

3. For what values of real numbers x, does the series $\sum_{n=1} \sin^{g} x$ converge ?

4. Fill in the blanks : The polar equation of the circle with centre origin and radius a is ____________

5. Find the n^{th} term of the sequence 2, - 2, 2, 2 ____________

6. Fill in the blanks : If $f(x, y) = 1 - \sinh(1 - xy)$, then $f_x(1,1)$. ____________

7. Fill in the blanks: If f is continuous on $[a, b)$, then $\lim_{c \to b} \int_a^c f(t)\, dt =$ ____________

8. Write explicitly the ratio test for the convergence of the series $\sum_{n=0} a_n$.

9. State alternating series test of Leibniz.

10. Define — f(x,Y) using limit.

11. The power series $\sum_{n=0} a_n (x-a)^n$ always converges to a_0 when $x =$ ____________

12. What do you mean by linearization of a function in two variables at a point.

(12 x 1 = 12 marks)

Turn over

Part B (Short Answer Types)

Answer any nine *questions.*

13. Evaluate $\int_0^1 \sinh^2 x \, dx$.

14. Test the convergence of the integral $\oint_0^{/2} 1 - 2x$ dx.

15. State the non-decreasing sequence theorem.

16. Describe the level surface of the function f (x, y, z) = Jx2 + y2 + z^2 1.

17. Graph the sets of points whose polar co-ordinates satisfy the condition $0 < r < 2$.

18. Evaluate J $\frac{1}{i}$ $3dx$ o V4 + $9x^2$

19. Find tanh x, if cosh x = $\frac{17}{15}$, $x > 0$.

20. Show that $\frac{eie}{w}$ $a^2 f = 0$ if f (x, y) $= log$ NIX$^2 + y^2$.

21. Find a cylindrical co-ordinate equation for the surface x^2 + – $3)^2 = 9$.

22. Find $\frac{}{ar}$. $z = x + 2y$, $x = \frac{r}{}$ and y 2rs.

23. Find Ern $\frac{}{2n+1}$ n

24. Write the Maclaurin series for sin x.

(9 x 2 = 18 marks)

Part C (Short Essay Types)

Answer any **six** *questions.*

25. Find the length of the curve y = $\frac{2v2}{3}$ r‾ 3 x^2 ~~-1 from~~ m x = 0 to $x = 1$.

26. Find the limit of the function f(x, y) = $\frac{x^2 - xy}{vx}$ ~~- /- as (x,y) tend~~s to (0, 0).

27. Replace the polar equation $r = \frac{4}{2\cos 0 - \sin^{\circ}}$ by equivalent Cartesian equation and the draw the graph in Cartesian form.

28. Find a power series for log $(1 + x)$ and find the radius of convergence of that series.

29. Show that tank-1 x = 2 $\frac{(1+x1}{1-x}$.

30. Find the volume of the solid of revolution when the region between the parabola $x = y^2 4\text{-}1$ and the line $x = 3$ is revolved about the line $x = 3$.

31. Find the sum of the series $\underset{n=1}{L,} \frac{2' -1}{4n}$ •

32. Find the radius and interval of convergence of the series : $\underset{n=0}{E} (-1)n \, (2x - 1)^n$.

33. Evaluate : $\int r \cos h^4$ dx.

(6 x 5 = 30 marks)

Part D (Essay Types)

Answer any two questions.

34. Show that the function $f(x,y)$ $\frac{2}{x^2 + y^2}$ when $(x,y) * (0,0)$ and 0, otherwise is continuous everywhere except at the origin.

35. (a) Find the linearization of the function $f(x, y) = x^2 - xy + y^2 / _2 + 3$ at (3, 2).

(b) Find the area of the region enclosed by the cardioid : r = 2(1 + cos 0).

36. Find the area of the surface generated by revolving the curve $y = x^3 / 9, 0 < x$ 2 about the x-axis.

(2 x 10 = 20 marks)