Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **19MA1013** | **Duration :** | **3hrs** |
| **Sub. Name :** | **MULTIVARIABLE CALCULUS AND DIFFERENTIAL EQUATIONS** | **Max. Marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)** | | | |
| 1. | Examine the convergence of the sequence . | CO2 | 1 |
| 2. | The series is \_\_\_\_\_\_\_\_\_\_\_\_\_ | CO2 | 1 |
| 3. | Find the value of . | CO1 | 1 |
| 4. | The volume of the solid generated by the revolution about y-axis is \_\_\_\_\_\_\_\_\_\_ | CO1 | 1 |
| 5. | If , find the Fourier coefficient . | CO2 | 1 |
| 6. | Write down the Fourier cosine series for . | CO2 | 1 |
| 7. | If  , find . | CO5 | 1 |
| 8. | If , find . | CO3 | 1 |
| 9. | The area enclosed by plane curves whose equations are in Cartesian form is \_\_\_\_\_\_\_\_\_ | CO4 | 1 |
| 10. | Evaluate . | CO4 | 1 |

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| **PART – B (6 X 3 = 18 MARKS)** | | | |
| 11. | Test the convergence of the series . | CO2 | 3 |
| 12. | Show that | CO1 | 3 |
| 13. | Express  as a half range Fourier cosine series in . | CO2 | 3 |
| 14. | Find the directional derivatives of  at the point  in the direction of the vector . | CO5 | 3 |
| 15. | Evaluate  over the cardioid above the initial line. | CO4 | 3 |
| 16. | Solve | CO6 | 3 |

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| **PART – C (6 X 12= 72 MARKS)**  **(Answer any five Questions from Q.no 17 to 23. Q.No 24 is a Compulsory Question)** | | | | |
| 17. | a. | Show that the series  converges if and diverges if | CO2 | 8 |
| b. | Determine the nature of the series | CO2 | 4 |
|  |  |  |  |  |
| 18. |  | State and prove the relation between beta and gamma functions. | CO1 | 12 |
|  |  |  |  |  |
| 19. |  | Determine the first two harmonics of the Fourier series for the following values:   |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X0 | 0 | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | | y | 7.9 | 8.0 | 7.2 | 5.6 | 3.6 | 1.7 | 0.5 | 0.2 | 0.9 | 2.5 | 4.7 | 6.8 | | CO2 | 12 |
|  |  |  |  |  |
| 20. | a. | Discuss the maxima and minima of *f(x,y) = x3y2(1-x-y)* | CO3 | 8 |
| b. | If  , find . | CO3 | 4 |
|  |  |  |  |  |
| 21. | a. | Show that the area between the parabolas | CO4 | 6 |
| b. | Evaluate | CO4 | 6 |
|  |  |  |  |  |
| 22. |  | Expand  as a Fourier series in the interval . | CO2 | 12 |
|  |  |  |  |  |
| 23. | a. | Find the volume of the reel shaped solid formed by the revolution of the part of the parabola  cut off by the latus rectum. | CO1 | 6 |
| b. | Find the surface area of the solid generated by the revolution of the asteroid  about the y-axis. | CO1 | 6 |
|  |  | **Compulsory:** | | |
| 24. | a. | Solve . | CO6 | 6 |
| b. | Solve *x2(y-z)p + y2(z-x)q = z2(x-y)*  Question No.24 from Module 6 | CO6 | 6 |