

**Savitribai Phule Pune University**

Interdisciplinary School of Scientific Computing

**End Sem. Exam. Dec. 2018**

**Course No. :** SC – 104

**Title :** Foundation of Scientific Computing- II

#### Date: 11 Dec. 2018 Marks : 50

Time : 10:30am to 1:00pm

**Note :**  1) Q.1 is compulsory. Answer any six of the remaining questions.

2) Answers to all sub questions of a question should appear together.

Q.1 Attempt any seven. (2 marks each.)

1. Plot the graph of  , 

lim

x→0

1. Evaluate the limit 
2. 





What value of will make continuous?

1. Calculate  from the equation 
2. Classify the critical points of 
3. Show that 
4. In usual notation find  satisfying Mean Value Theorem.



1. Calculate the area bounded by the curves and 
2. Examine the convergence of the series 

∞

∑

n = 0

1. Find the region of convergence of the power series 

∞

∑

n = 1

1. Solve the differential equation.



Q.2 Consider the function 

(i) Determine the regions in which the function is increasing , decreasing, concave up and concave (2)

down.

(ii) Locate and classify the critical points. Determine the points of inflection. (2)

(iii) Plot the graph of the function for  (2)

Q.3 (a) A particle projected vertically upwards with a speed of  reaches height  (2)

in  seconds. What must be the initial velocity so that the maximum height achieved by the particle

is 

(b) An isosceles triangle is drawn with its vertex at the origin, its base parallel to and above  (4)

The vertices of the base are on the curve Determine the area of the largest such isosceles

triangle.

Q.4 (a) Determine the equations of tangents to the circle  at points where the parabola  (3)

meets the circle. 

(b)Evaluate any one integral. (3)

 OR 

Q.5 (a)Evaluate any one integral. (3)

 **OR**  

(b) Evaluate any one integral. (3)

 **OR **

Q.6 (a) Calculate the area of the sphere of radius using integration. (3)

(b)Calculate the volume of the solid generated by rotating the region bounded by the curve (3)

 and the line around 

Q.7 (a) Is the series  convergent? If convergent find the sum. If not, give reasons. (1)

∞

∑

n = 0

(b) Examine the convergence of any one series. (2)

∞

∑

n = 1

∞

∑

n = 0

(i)    **OR**  

(c ) Check for absolute/conditional convergence. (3)

∞

∑

n = 2

∞

∑

n = 0

(i)    **OR**  

Q.8 (a) Find the region of convergence of the given power series. (2)

∞

∑

n = 0

∞

∑

n = 1

 **OR**  

(b) Calculate the Fourier series for the function. (4)

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Using this series prove that



Q.9 Solve the following differential equations.

(a)  **OR**   (3)

(b)   **OR**  (3)

Q.10 (a) Using integration of convergent power series show that (2)

∞

∑

n = 1

 =  for 

(b) Find the general solution of the following second order equation. (4)

 **OR**  

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