**JAIPUR ENGINEERING COLLEGE & RESEARCH CENTRE**

**TUTORIAL SHEET**

**Year: B. Tech. I Year I Semester**

**Subject: Engineering Mathematics - I**

**Session: 2020-21**

**CO1. Understand fundamental concepts of improper integrals, beta and gamma functions and their properties. Evaluation of Multiple Integrals in finding the areas, volume enclosed by several curves after its tracing and its application in proving certain theorems.**

**TUTORIAL SHEET NO.1**

Q.1 The Cardioids revolves about the initial line. Find the volume of solid generated.

Q.2 Find the volume bounded by the cylinder and the planes and z=0.

**TUTORIAL SHEET NO.2**

Q.3 Evaluate by changing the order of Integration. Q.4 Prove that :

**TUTORIAL SHEET NO.3**

Q.5 Find the surface area of the solid generated by the revolution of the asteroid about the x-axis.

Q.6 Find by Double Integration the area of the Region enclosed by and (In the First Quadrant)

**TUTORIAL SHEET NO.4**

Q.7 Find the centre of Gravity of the arc of the curve lying in the first Quadrant.

Q.8

**TUTORIAL SHEET NO.5**

Q.9 Evaluate throughout the volume of the sphere .

Q.10 Use Green’s Theorem in a Plane to evaluate Where C is the boundary of the circle in the XY-Plane.

**TUTORIAL SHEET NO.6**

Q.11 Evaluate by Stoke’s Theorem , Where and C is the boundary of the triangle with vertices at (0,0,0),(1,0,0) and (1,1,0).

Q.12 Verify Divergence Theorem for the function over the cylindrical region bounded by

**CO2. Interpret the concept of a series as the sum of a sequence, and use the sequence of partial sums to determine convergence of a series. Understand derivatives of power, trigonometric, exponential, hyperbolic, logarithmic series.**

**TUTORIAL SHEET NO.1**

Q.1 Test the Convergence of the series**.**

Q.2 Test the Convergence of the series whose term is

**TUTORIAL SHEET NO.2**

Q.3 Test the Convergence of the series

Q.4 Test the Convergence of the series

**TUTORIAL SHEET NO.3**

Q.5 Test the Convergence of the series for positive values of x;

Q.6 Test the Convergence of the series

**TUTORIAL SHEET NO.4**

Q.7 Test the Convergence of the series

Q.8 Test the Convergence of the series

**TUTORIAL SHEET NO.5**

Q.9 Test the Convergence of the series

Q.10 Discuss the Convergence of the series

**TUTORIAL SHEET NO.6**

Q.11 Test the Convergence of the series

Q.12 Test the Convergence of the series **……….**

**CO3. Recognize odd, even and periodic function and express them in Fourier series using Euler’s formulae.**

**TUTORIAL SHEET NO.1**

Q.1: Find a series of sines and cosines of multiples of x which will represent the function in the interval . Hence show that

Q.2 Find the Fourier series expansion for if . Deduce that

**TUTORIAL SHEET NO.2**

Q.3 If the function is defined by . Obtain a Fourier series of .Deduce that

Q.4 Expand in the range 0 as a Fourier series.

**TUTORIAL SHEET NO.3**

Q.5 ). Find the cosine series for the function

Q.6 Obtain the Fourier series for the function

and deduce the following relations from it:

**TUTORIAL SHEET NO.4**

Q.7 Find the Fourier series to represent

Q.8 Find the Fourier series to represent .

**TUTORIAL SHEET NO.5**

Q.9 If the function is defined by .

Q.10 If the function is defined by .

**TUTORIAL SHEET NO.6**

Q. 11 Obtain the Fourier series for the function

Q.12 Find the Fourier series to represent

**CO-4: Understand the concept of limits, continuity and differentiability of functions of several variables. Analytical definition of partial derivative. Maxima and Minima of functions of several variables. Define gradient, divergence and curl of scalar and vector functions.**

**T -1**

1. Evaluate:
2. , show that

**T - 2**

1. If then discuss the continuity of f(x, y) at the origin.
2. Prove that: =

**T – 3**

1. Find the divergence and curl of the vector: =
2. A vector field is given by =

**T – 4**

1. Discuss the continuity of the function when (x,y) = (0,0).
2. If , Show that f is discontinuous at origin.

**T – 5**

1. Find the directional derivative of f(x, y)= at P(2, 8) in the direction of Q(5,4).
2. In a ABC, find the maxima and minima of u = sin A sin B sin C where A + B + C =

**T – 6**

1. Show that the volume of the greatest rectangular paralleleopiped that can be inscribed in the ellipsoid + + = 1 is
2. Find the tangent plane to the elliptic paraboloid z = 2x2 + y2 at the point P(1, 1, 3).