



# TAMIL NADU OPEN UNIVERSITY

Chennai - 15  
School of Science

## ASSIGNMENT

Programme Code No : 132  
Programme Name : B.Sc., Mathematics with Computer Applications  
Course Code & Name : BMC-11, Elements of Calculus  
Batch : AY 2019-20 – I Year  
No.of Assignment : One Assignment for Each 2 Credits  
Maximum CIA Marks : 25 (Average of Total No. of Assignment)

### Assignment – I

Answer any one of the question not exceeding 1000 words.

Max: 25 Marks

1. Prove that  $\frac{\partial^2 v}{\partial x^2} + \frac{\partial^2 v}{\partial y^2}$  can be transformed into  $\frac{\partial^2 v}{\partial r^2} + \frac{1}{r^2} \frac{\partial^2 v}{\partial \theta^2} + \frac{1}{r} \frac{\partial v}{\partial r}$  using polar coordinates.
2. Derive the reduction formula for  $\int \sin^m x \cos^n x dx$  and hence evaluate  $\int_0^{\pi/2} \sin^m x \cos^n x dx$ , where m and n positive integers.
3. State and prove Leibnitz Theorem and hence find the  $n^{\text{th}}$  derivative of  $e^x \log x$

### Assignment – II

Answer any one of the question not exceeding 1000 words.

Max: 25 Marks

1. Derive the formula for Radius of curvature.
2. Derive the reduction formula for  $\int \cos^m x \cos^n x dx$  and hence evaluate  $\int_0^{\pi/2} \cos^m x \cos^n x dx$ , and hence prove that  $\int_0^{\pi/2} \cos^n x \cos^n x dx = \frac{\pi}{2^{n+1}}$
3. Define Gamma function, Show that the Gamma function  $\Gamma(n)$  converges for  $n > 0$  and derive the recurrence formula.

### Assignment – III

Answer any one of the question not exceeding 1000 words.

Max: 25 Marks

1. Derive the reduction formula for  $\int \sin^n x \, dx$  and hence evaluate  $\int_0^{\pi/2} \sin^n x \, dx$ .
2. State and prove Cauchy's second theorem on limits.
3. State and prove D'Alembert's Ratio Test.

### Assignment – IV

Answer any one of the question not exceeding 1000 words.

Max: 25 Marks

1. Derive the reduction formula for  $\int \cos^n x \, dx$  and hence evaluate  $\int_0^{\pi/2} \cos^n x \, dx$ .
2. Define Beta function and explain properties of Beta function.
3. State and prove Raabe's Test.



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## ASSIGNMENT

Programme Code No : 132  
Programme Name : B.Sc., Mathematics with Computer Applications  
Course Code & Name : BMC-12, Trigonometry, Analytical Geometry  
(3d) and Vector Calculus  
Batch : AY 2019-20 – I Year  
No.of Assignment : One Assignment for Each 2 Credits  
Maximum CIA Marks : 25 (Average of Total No. of Assignment)

### Assignment – I

Answer any one of the question not exceeding 1000 words.

Max: 25 Marks

- (a) Find the equation of a cone with vertex at the origin.  
(b) Find the equation of the right circular cylinder of radius 2 whose axis passes through (1,2,3) and has direction cosines proportional to (2,-3,6).
- Show that  $\nabla^2 r^n = n(n+1)r^{n-2}$ .
- (a). Find the equation of the right circular cone whose vertex is origin and guiding curve the circle  $x^2 + y^2 + z^2 + 2x - y + 3z - 1 = 0, x - y + z + 4 = 0$ .  
(b). Find the equation of the sphere having its centre (5,-2,3) and which touches the line  $\frac{x-1}{6} = \frac{y+1}{2} = \frac{z-12}{-3}$ .

### Assignment – II

Answer any one of the question not exceeding 1000 words.

Max: 25 Marks

- (a) Find the equation of the cylinder whose generators intersect the curve  $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0, z = 0$  and are parallel to line  $\frac{x}{l} = \frac{y}{m} = \frac{z}{n}$ .  
(b) Find the equation of the right circular cylinder whose generators are parallel to the line  $x = -2y = 2z$  and which touch the sphere  $x^2 + y^2 + z^2 - 2y - 4z - 11 = 0$ .

2. Verify Gauss's Divergence theorem over the cube bounded by the planes  $x = 0$ ,  $x = 1$ ;  $y = 0$ ,  $y = 1$ ;  $z = 0$  and  $z = 1$  for  $F = x^2 i + y^2 j + z^2 k$ .
- 3 (a). Find the Length of the Tangent from an external point to the general sphere  
 (b) Find the condition that the plane  $lx + my + nz = p$  may be a tangent plane to the Sphere  $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ .

### Assignment – III

Answer any one of the question not exceeding 1000 words.

Max: 25 Marks

1. Prove  $\text{Curl curl } \mathbf{F} = \text{grad div } \mathbf{F} - \nabla^2 \mathbf{F}$ .
2. Verify Gauss's Divergence theorem for the function  $F = 2xzi + yzj + z^2k$  over the upper half of the sphere  $x^2 + y^2 + z^2 = a^2$ .
3. (a) Derive the condition for two general spheres to cut orthogonally.  
 (b) Show that the spheres  $x^2 + y^2 + z^2 + 3x + 5y + z - 7 = 0$  and  $x^2 + y^2 + z^2 + 2x + 7y + 3z - 6 = 0$  are orthogonal.

### Assignment – IV

Answer any one of the question not exceeding 1000 words.

Max: 25 Marks

1.  $\text{Curl } (u \times v) = v \nabla u - u \nabla v + u \text{ div } v - v \text{ div } u$ .
2. Verify Gauss's divergence Theorem for  $F = (x^2 \cdot yz)i + (y^2 \cdot zx)j + (z^2 \cdot xy)k$  taken over the rectangular parallelepiped  $0 \leq x \leq a, 0 \leq y \leq b, 0 \leq z \leq c$ .
3. (a) Derive the volume of a tetrahedron when the vertices are given.  
 (b) Find the equation of the cone whose vertex is at the point  $(\alpha, \beta, \gamma)$  and whose generators intersect the guiding curve  $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0, z = 0$ .



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## ASSIGNMENT

Programme Code No : 132  
Programme Name : B.Sc., Mathematics with Computer Applications  
Course Code & Name : BMC-13, Computer Fundamentals and PC Software  
Batch : AY 2019-20 – I Year  
No.of Assignment : One Assignment for Each 2 Credits  
Maximum CIA Marks : 25 (Average of Total No. of Assignment)

### Assignment – I

Answer any one of the question not exceeding 1000 words.

Max: 25 Marks

1. Write a note on Communication through Network.
2. Write a note on Text Formatting.
3. Write a note on Multi-media.

### Assignment – II

Answer any one of the question not exceeding 1000 words.

Max: 25 Marks

1. Write a note on Internet.
2. Write a note on Page Formatting.
3. Write a note on working with files and folders