TAMIL NADU OPEN UNIVERSITY

Chennai - 15

School of Science

ASSIGNMENT

Programme Code No	: 131
Programme Name	: B.Sc., Mathematics
Course Code & Name	: BMS-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 Assignments)

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 transformd 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^{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 $\int cos^m x \cos nx\; dx$ and hence evaluate

   $\int_0^{\pi/2} cos^m x \cos nx\;\; dx$, and hence prove that $\int_0^{\pi/2} cos^n x \cos nx\; dx\; = \frac{\pi}{2^{n+1}}$
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 : 131
Programme Name : B.Sc., Mathematics
Course Code & Name : BMS-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 Assignments)

Assignment – I

Answer any one of the question not exceeding 1000 words Max: 25 Marks

1. (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).

2. Show that $\nabla^2 r^n = n(n + 1)\, r^{n-2}$.

3. (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

1. (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 $x^2 + y^2 + z^2$ ï 2y ï 4z ï 11 = 0.

2. Verify Gaussõs 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 Curl curl **F** = grad div F - $\nabla^2 F$.
2. Verify Gaussôs 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 $x^2 + y^2 + z^2 + 3x + 5y$ ï z ï 7 = 0 and $x^2 + y^2 + z^2 + 2x$ ï 7y ï 3z ï 6 = 0 are orthogonal.

Assignment – IV

Answer any one of the question not exceeding 1000 words Max: 25 Marks

1. Curl (u x v) = v ∇u -u ∇v + u div v ï v div u.
2. Verify Gaussôs divergence Theorem for F = (x^2 ï yz)i + (y^2 ï zx)j + (z^2 ï 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 (α, β, γ) 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	: 131
Programme Name	: B.Sc., Mathematics
Course Code & Name	: BMS-13, Differential Equations
Batch	: AY 2019-20 – I Year
No.of Assignment	: One Assignment for Each 2 Credits
Maximum CIA Marks	: 25 (Average of Total No. of Assignments)

Assignment – I

Answer any one of the question not exceeding 1000 words Max: 25 Marks

1. Solve: $x^2 \frac{d^2y}{dx^2} + 3x\frac{dy}{dx} + y = \frac{1}{(1-x)^2}$

2. Solve by the method of variation of parameters.

   $\frac{d^2y}{dx^2}$ + 4 y = cosec 2x

3. (a) Solve : $(D^2 - 8D + 9)Y = 8\cos 5x$.

   (b) Solve : (D^2 ï 5D + 6) Y = x^2 ï x + 2

Assignment – II

Answer any one of the question not exceeding 1000 words Max: 25 Marks

1. Solve: $x^2 \frac{d^2y}{dx^2} - x\frac{dy}{dx} + y = \frac{\log x.\sin(\log x)+1}{x}$

2. Solve by the method of variation of parameters.

$$x^2\frac{d^2y}{dx^2} + x\,\frac{dy}{dx} - y = x^2e^x$$

3. (a). Solve : $(D^2 - 4D + 3)Y = \sin 3x \cos 2x$.

   (b). Solve : $(D^2$ ï $2D + 4)\ Y = e^x \cos x$.