TAMILNADUOPENUNIVERSITY

Chennai - 15

School of Science

ASSIGNMENT

Programme Code No : 131
Programme Name : B.Sc., Mathematics
Course Code & Name : BMS-11, Elements of Calculus
Batch : CY 2020 and previous CY Batches
No.of Assignment : One Assignment for Each 2 Credits
Maximum CIA : 15Marks (Average of total no. of Assignments)

Assignment – I

Max : 15 Marks

Answer any one of the following questions.

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

Assignment – II

Max : 15 Marks

Answer any one of the following questions.

Answer any two of the questions. Each question carries 30 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 D'Alembert's Ratio Test.
3. State and prove Cauchy's second theorem on limits.

Assignment – III

Max : 15 Marks

Answer any one of the following questions.

1. Derive the formula for Radius of curvature.

2. Define Gamma function, Show that the Gamma function $\Gamma(n)$ converges for n>0 and derive the recurrence formula.

3. 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 $\int_0^{\pi/2} cos^n x \cos nx \, dx = \frac{\pi}{2^{n+1}}$

Assignment – IV

Max : 15 Marks

Answer any one of the following questions.

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. State and prove Leibnitz Theorem and hence find the n^{th} derivative of e^x log *x.*

3. 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.

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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 : CY 2020 and Previous CY Batches
No.of Assignment : One Assignment for Each 2 Credits

Maximum CIA : 15Marks (Average of total no. of Assignments)

Assignment – I

Max : 15 Marks

Answer any one of the following questions.

1. Curl (u x v) = v ∇u -u ∇v + u div v – v div u.

2 .(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.

3. Verify Gauss's divergence Theorem for F = $(x^2 – yz)i + (y^2 – zx)j + (z^2 – xy)k$ taken over the rectangular parallelepiped $0 \le x \le a, 0 \le y \le b, 0 \le z \le c$.

Assignment – II

Max : 15 Marks

Answer any one of the following questions.

1. Prove Curl curl**F** = grad div F - $\nabla^2 F$.

2.(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.

3. Verify Gauss's Divergence theorem for the function F = 2xzi + yzj + z^2k over the upper half of the sphere $x^2 + y^2 + z^2 = a^2$.

Assignment – III

Max : 15 Marks

Answer any one of the following questions.

Answer any two of the questions. Each question carries 30 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 $x^2 + y^2 + z^2 - 2y - 4z - 11 = 0$.

2 (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 $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$.

3. 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 $F = x^2 I + y^2 j + z^2 k$.

Assignment – IV

Max : 15 Marks

Answer any one of the following questions.

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.(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 $\frac{x-1}{6} = \frac{y+1}{2} = \frac{z-12}{-3}$.

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

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ASSIGNMENT

Programme Code No : 131
Programme Name : B.Sc., Mathematics
Course Code & Name : BMS-13, Differential Equations
Batch : CY 2020 and previous CY Batches
No.of Assignment : One Assignment for Each 2 Credits

Maximum CIA : 15Marks (Average of total no. of Assignments)

Assignment – I

Max : 15 Marks

Answer any one of the following questions.

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

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

(b). Solve : $(D^2 - 2D + 4)$ Y = e^x cosx.

3. Solve by the method of variation of parameters.

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

Assignment – II

Max : 15 Marks

Answer any one of the following questions.

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

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

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

3. Solve by the method of variation of parameters.

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