Question Paper

Exam Date & Time: 02-May-2023 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
END SEMESTER THEORY EXAMINATION - MAY 2023
II SEMESTER B.Sc (Applied Sciences) in Engg.
Mathematics - II [IMA 121]

Marks: 50 **Duration: 180 mins.**

Answer all the questions.

Missing data, if any, may be suitably assumed

1) Evaluate $\iint xydxdy$ where the region is bounded by x-axis, ordinate x=2a and the curve $x^2 = 4ay$. (3)

A)

B) Evaluate $\int_0^{\frac{a}{\sqrt{2}}} \int_{x=y}^{\sqrt{a^2-y^2}} \log_e(x^2+y^2)dxdy$ by changing to polar co-ordinate system. (3)

C) Evaluate $\iiint_S \sqrt{x^2+y^2}dxdydz$ where S is the solid bounded by the surfaces $x^2+y^2=z^2, z=0, z=1$. (4)

2) Find the equation of the smallest sphere which contains the circle $x^2+y^2+z^2+2x+6y+4z-11=0,\ 2x+2y+z+1=0$. (3)

A)

B) Find the equation of the right circular cone generated when the straight line $2y+3z=6,\ x=0$ revolves about z-axis (3)

C) Show that $\int_0^{\frac{\pi}{2}} \frac{d\theta}{\sqrt{\sin\theta}}\ X\ \int_0^{\frac{\pi}{2}} \sqrt{\sin\theta}\, d\theta = \pi$ (4)

3) Find the angle between the surfaces $xy^2z = 3x+z^2$ and $3x^2-y^2+2z=1$ at the point (1, -2, 1) (3)

A)

B) Verify Green's theorem in the plane for $\oint_c (xy+y^2)dx + x^2dy$ where c is the closed curve of the region bounded by $y=x$ and $y=x^2$. (3)

C) Find all the eigen values and any one corresponding eigen vector of (4)