Reg. No. : ....

Name : ....

III Semester B.Sc. Degree (C.B.C.S.S.– O.B.E.– Regular/Supplementary/ Improvement) Examination, November 2024
(2019 to 2023 Admissions)
COMPLEMENTARY ELECTIVE COURSE IN MATHEMATICS
3C03 MAT-PH : Mathematics for Physics – III

Time : 3 Hours   Max. Marks : 40

PART – A

Answer **any four** questions from this Part. **Each** question carries **1** mark.

(4×1=4)

1. Define double integral of a function f over a region R.

2. Define the average value of an integrable function f over a region R.

3. Write the standard parametric equation of the line through a point P parallel to a vector v.

4. When can you say that a vector function r(t) is continuous at a point $t = t_0$ in its domain ?

5. If f(x) has period p then find the period of f(nx).

PART – B

Answer **any 7** questions from this Part. **Each** question carries **2** marks.   (7×2=14)

6. Evaluate the iterated integral $\int_1^2 \int_0^4 2xy\,dy\,dx$.

7. Evaluate double integral $\iint_R \frac{\sqrt{x}}{y^2}\,dA$ over the rectangle R : $0 \le x \le 4, 1 \le y \le 2$.

8. Find the area of the region R bounded by y = x and y = x^2 in the first quadrant.

P.T.O.

9. Find the volume of the solid region bounded above by the paraboloid $z = 9 = x^2 - y^2$ and below by the unit circle in the xy-plane.

10. Find the point where the line $x = \frac{8}{3} + 2t, y = -2t, z = 1+t$ intersects the plane $3x + 2y + 6z = 6$.

11. Find the distance from the point S(1,1,5) to the line L: x = 1 + t, y = 3 – t, z = 2t.

12. Let u and v be differentiable vector functions of t, then find $\frac{d}{dt}[u(t).v(t)]$.

13. Is $L[f(t)g(t)] = L[f(t)]L[g(t)]$? Explain.

14. Show that sum of two odd function is odd.

15. Find the Laplace transform of $f(t) = e^{at} \sin wt$.

16. Write down the Euler formula for calculating the Fourier coefficient.

PART – C

Answer **any 4** questions from this Part. **Each** question carries **3** marks.   (4×3=12)

17. Find the volume of the region bounded above by the elliptical paraboloid $z = 16 - x^2 - y^2$ and below by the square R : $0 \le x \le 2, 0 \le y \le 2$.

18. Integrate F(x,y,z) = 1 over the tetrahedron D with vertices (0,0,0), (1,1,0), (0,1,0) and (0,1,1) in the order dzdydx.

19. Find the velocity, speed, and acceleration of a particle whose motion in space is given by the position vector r(t) = 2cost i + 2sint j + 5cos2t k.

20. Find the curve's unit tangent vector of r(t) = 2cost i + 2sint j + $\sqrt{5}$t k. Also, find the length of the curve in the portion $0 \le t \le \pi$.

21. Find the Laplace transform of the integral $\int_0^t te^{-4t} \sin 3t\,dt$.