61505

V Semester B.A./B.Sc. Examination, March/April 2022
(CBCS)
MATHEMATICS – V

Time : 3 Hours Max. Marks : 70

Instruction : *Answer* ***all*** *questions.*

PART – A

Answer **any five** questions : **(5×2=10)**

1. a) In a ring (R, +, .) prove that $a.(b - c) = a.b - a.c$, $\forall a, b, c \in R$.

   b) Define sub-ring of a ring. Give an example.

   c) Show that $f : (z, +, .) \to (z, +, .)$ defined by $f(x) = x$, $\forall x \in z$ is a homomorphism.

   d) Find the unit normal vector to the surface $xy^3z^2 = 4$ at $(-1, -1, 2)$.

   e) If $\vec{F} = yz\hat{i} + zx\hat{j} + xy\hat{k}$, show that $\vec{F}$ is irrotational.

   f) Evaluate $\Delta^{10}\left[(1-ax)(1-bx^2)(1-cx^3)(1-dx^4)\right]$.

   g) Write Lagrange's interpolation formula for unequal intervals.

   h) Evaluate $\int_0^b \frac{1}{1+x^2}\,dx$ using Simpson's $\frac{3}{8}^{th}$ rule given

x	0	1	2	3	4	5	6
y	1	0.5	0.2	0.1	0.0588	0.0385	0.027

PART – B

Answer **two full** questions : **(2×10=20)**

2. a) Prove that every field is an integral domain.

   b) Prove that the set $R = \{0, 1, 2, 3, 4, 5\}$ is a commutative ring w.r.t. $+_6$ and x_6 as the two compositions.

OR

P.T.O.