CLASS – XII MATHEMATICS ASSIGNMENT NO. 2 TOPIC – relations and functions

Q1 Let n be a fixed positive integer. Define a relation R on Z as follows (a, b) ∈ R ⇔ a-b is divisible by n. Show that R is an equivalence relation on z.

Q2. Let z be the set of integers show that the relation
R = [a, b) : a, b ∈ z and a + b is even] is an equivalence relation on z.

Q3. Let S be a relation on the set R of real numbers defined by
S = [(a, b) ∈ R x R : $a^2 + b^2 = 1$} prove that S is not an equivalence relation R.

Q4. Show that the relation R on the set R of real numbers defined as
R = [(a, b) : : $a < b^2$] is neither reflexive nor symmetric nor transitive.

Q5. Show that the relation R on R defined as R = [(a, b) : a ≤] is reflexive and transitive but not symmetric.

Q6. Show that f : R → R, defined as $f(x) = x^3$, is a bijection.

Q7. Show that the modulus function f R → R, given by f(x) = [x] is neither one-one nor on-to.

Q8. Show that the function of F : R→R given by $f(x) = x^3 + x$ is a bijection.

Q9. Let A = R –[2] and B = B-[1]. If f : A → B is a mapping defined by f(x) $\frac{x-1}{x-2}$, show that f is bijective.

Q10. Show that f: R→R, given f(x) = x – [x], is neither one-one or onto.

Q11. Ret f(x) = [x] and g(x) = [x], Find

(i) (gof) $\left(\frac{-5}{3}\right)$ - (fog) $\left(\frac{-5}{3}\right)$ (ii) (gof) $\left(\frac{5}{3}\right)$ - (fog) $\left(\frac{5}{3}\right)$ (iii) (f+2g) (-1)

Q12. If f(x) = $\frac{3x-2}{2x-3}$, prove that f (f(x) = x for all x ∈R - $\left\{\frac{3}{2}\right\}$

Q13. Find fog and gof, if (i) $f(x) = e^x$, g(x) = $\log e^x$ (ii) f(x) = x + 1, g(x) = 2x + 3

Q14. Prove that the function f : R→R defined by f(x) = 2x-3 is invertible find f.

Q15. Let F : N → R be a function defined as $f(x0 = 4x^2 + 12x + 15$. Show that f: N → Range (f) is invertible. Find the inverse of f.

Q16. Show that f: [-1, 1] →R, given by f(x) = $\frac{x}{x+2}$ is one-one, find the inverse of the function f: (-1, 1) →Range (f).

Q17. Let 'x' be a binary operation on set 2 – [1] defined by a x b = a + b – ab ; a, b, - Q – [1]. Find the identity element with respect to on Q. Also, prove that every element of Q – [1] is invertible.

Q18. Consider the binary operation ∗ on the set 3 = {1, 2, 3, 4, 5} defined by A ∗ B = Minimum of a and B. Write the composition table of a and b.