2021
MATHEMATICS – HONOURS
SEMESTER-2
INTERNAL ASSESSMENT
Full Marks of each Course: 10

The figures in the margin indicate full marks.
Symbols and notations used here carry their usual meaning.
Candidates are required to give their answers in their own words as far as practical.

Course: CC3 (Real Analysis)

Choose the correct alternative with proper justification: 5x2=10

1. If $A = \{x \in R:\ 3x^2 + 8x - 3 < 0\}$. Then
   (a) $SupA = \frac{1}{2},\ InfA = -3$ (b) $SupA = \frac{1}{3},\ InfA = -3$
   (c) $SupA = 3,\ InfA = -\frac{1}{3}$ (d) none of these

2. Let G is an open set in R and S be a subset of R such that $G \cap S = \emptyset$
   (a) $G' \cap S$ closed set always (b) $G \cap S' = \emptyset$ (c) $G \cap S \neq \emptyset$ (d) none of these

3. Limit of the sequence $a_n = 2 + (-1)^n 2^{-n}$ is
   (a) 0 (b) 2 (c) $\mathbf{\frac{1}{2}}$ (d) None of these.

4. The Series $\sum_{n=0}^{\infty} \frac{1}{n^2+3n+2}$
   (a) Diverges to ∞ (b) Diverges to $-\infty$ (c) Converges to 1 (d) None of these

5. The infinite series $1 - \frac{1}{3^2} + \frac{1}{5^2} - \frac{1}{7^2} + \frac{1}{9^2} - \cdots$ is

   (a) Conditionally convergent (b) Divergent

   (c) Oscillating Infinitely (d) Absolutely Convergent

Course: CC4 (Group Theory - I)

Choose the correct alternative with proper justification: 5x2=10

6. If a and b be two distinct elements of order 2 in a commutative group G, then $(ab)^4$ is

(a) 1 (b) 2 (c) 4 (d) none of these

7. If A and B be two commutative subgroups of a group G, then which of the following statement is true?

(a) $A\Delta B$ is a group, but not a subgroup of G.
(b) $A\Delta B$ is a commutative subgroup of G.
(c) $A\Delta B$ is a non-commutative subgroup of G.
(d) $A\Delta B$ is not a group.

8. Which of the following is true?
(a) Z_n is cyclic iff n is prime
(b) If every proper subgroup is cyclic, then the group is also so.
(c) Every proper subgroup of S_4 is cyclic.
(d) Every proper subgroup of Z_n is cyclic.

9. Let $G = (Z_6, +)$ and $\varphi : G \to G$ is defined by $\varphi(\overline{x}) = 3\overline{x}$, $\overline{x} \in Z_6$. Then $ker\varphi$ is
(a) $\{\overline{0}, \overline{1}\}$ (b) $\{\overline{0}, \overline{2}\}$ (c) $\{\overline{0}, \overline{3}\}$ (d) $\{\overline{0}, \overline{4}\}$

10. Let $G = S_3$ and H= A_3 Then $[G : H]$ is
(a) 1 (b) 2 (c) 3 (d) 0