B.Sc. DEGREE: BRANCH I- MATHEMATICS
(Effective from the academic year 2019-2020 and thereafter)

SUBJECT CODE: 19MT/MC/SS44

TITLE: SEQUENCES AND SERIES   TIME: 1 ½ HOURS

CORE: MAJOR CORE   MARKS: 50

Section – A

Answer all the questions   **3×2=6**

1. If $f(x) = x^4$ is defined in the range $[0,\infty)$, then find the value of $f^{-1}(-6)$ and $f(11)$

2. State the summation by parts formula.

3. Define odd and even functions with examples.

Section – B

Answer any three questions   **3×8=24**

4. Prove that the inverse image of the union of two sets is the union of the inverse images.

5. Prove the convergence of the sequence $\left\{\frac{1}{n}\right\}_{n=1}^{\infty}$.

6. Prove the convergence of $\sum_{n=1}^{\infty}\frac{1}{n^2}$, proving the necessary result.

7. Express $f(x) = x\sin x$ as a cosine series in $(0,\pi)$.

Section – C

Answer any one question   **1×20=20**

8. a) Prove that $[0, 1]$ is uncountable.

   b) State and prove the Ratio test.

                                                                                   (10+10)

9. Express as a Fourier series in $(0, 2\pi)$ the function $f(x) = \begin{cases} x(\pi - x), & 0 < x < \pi \\ -\pi(\pi - x), & \pi < x < 2\pi \end{cases}$.