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T.Y.B.Sc.(Sem.-V) Examination March - 2026

Mathematics MAJOR - MH-MJ-503 (Set-2) Real Analysis-I

[Total Marks: 25

સૂચના : / Instructions	Seat No.:
(1) ઉપરોક્ત દર્શાવેલ વિગતો ઉત્તરવહી પર અવશ્ય લખવી. Fill up strictly the above details on your answer book (2) All questions are compulsory. (3) Figures to the right indicate marks of the corresponding question.	Student's Signature

Q.1. Answer the following. (Any Five) **05**

1. Write first five terms of Fibonacci sequence.
2. Find greatest lower bound of the set $A = \{x \in R \,/\, x^2 \geq \pi\}$
3. If $f(n) = n + 7$ $(n \in I)$, $g(n) = 2n$ $(n \in I)$ then find the range of $f\,og$.
4. Is a sequence $\left\{\frac{1}{n}\right\}_{n=1}^{n=\infty}$ convergent? Justify your answer.
5. If A = $\{x \in N \,/\, 1 < x < 6\}$ and $B = \{x \in N \,/\, x < 8$ and x is an odd number$\}$, then obtain A × B.
6. Show that $\chi_{A'} = 1 - \chi_A$, Where χ_A is a characteristic function define on a set $A \subset S$.

Q.2. Answer the following. (Any Two) **10**

1. Show that countable union of countable sets is countable.
2. $f(x) = \sin x$, $(-\infty < x < \infty)$, *then show that*

   $f\left(\left[0,\frac{\pi}{6}\right] U \left[\frac{\pi}{6},\frac{\pi}{2}\right]\right) = f\left[0,\frac{\pi}{6}\right] U\ f\left[\frac{\pi}{6},\frac{\pi}{2}\right] = f\left[0,\frac{\pi}{2}\right]$
3. Prove that Define one–one function. Let $f : N \to N$, defined as $f(n) = 2n + 1$, Is f one-one and onto function? Justify your answer.

Q.3. Answer the following. (Any Two) **10**

1. Prove that if the sequence of real numbers $\{S_n\}_{n=1}^{\infty}$ is converges to L, then any subsequence of $\{S_n\}_{n=1}^{\infty}$ is also converges to L.
2. Show that the limit of the sequence $\left\{\frac{3n}{n+7\sqrt{n}}\right\}_{n=1}^{\infty}$ is 3.
3. If sequence $\{S_n\}_{n=1}^{\infty}$ is a given sequence such that $S_n \leq M$, $\forall n \in I^+$ and $\lim_{n\to\infty} S_n = L$ then show that $L \leq M$.
