BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BTECH
BRANCH: ALL

SEMESTER: BACKLOG
SESSION: SP/2019

SUBJECT: MA103 MATHEMATICS - I

TIME: 2 HOURS

FULL MARKS: 25

INSTRUCTIONS:
1. The total marks of the questions are 25.
2. Candidates may attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.

Q1 (a) Give an example of monotonic increasing sequence, monotonic decreasing sequence and an oscillatory sequence [2]

(b) Discuss the convergence of the sequence $\{a_n\}$ where $a_n = 1+\frac{1}{3}+\frac{1}{3^2}+\ldots+\frac{1}{3^n}$ [3]

Q2 (a) Test the convergence of $\sum_{n=1}^{\infty}\sin\frac{1}{n}$ [2]

(b) Test the convergence of the series $\frac{1}{3}+\left(\frac{2}{5}\right)^2+\left(\frac{3}{7}\right)^3+\ldots+\left(\frac{n}{2n+1}\right)^n+\ldots$ [3]

Q3 Test the convergence of the series $\sum\frac{1.3.5.....(2n-1)x^{2n+1}}{2.4.6.....2n(2n+1)}$ [5]

Q4 (a) Find the value of k such that the rank of the following matrix is 2 [2]

$$\begin{bmatrix}1 & 2 & 3\\ 2 & k & 7\\ 3 & 6 & 10\end{bmatrix}$$

(b) Using rank method find whether the system of equations $x+y+2z=4$; $2x-y+3z=9$; $3x-y-z=2$ are consistent or not [3]

Q5 Verify cayley-hamilton theorem for the matrix $\begin{bmatrix}1 & 2 & 0\\ -1 & 1 & 2\\ 1 & 2 & 1\end{bmatrix}$. [5]

Using this find A^{-1} and A^4

::::: 09/03/2019 ::::::M