Indian Institute of Information Technology, Sri City, Chittoor

Name of the Exam: Mathematics-III (RANAC) Duration: 1.5 hrs Max. Marks: 20

Instructions:

1. Clearly write your **Roll Number and Name in capital letters** on the top right corner of every page of the answer sheets. It is mandatory.
2. **All questions** are mandatory.
3. Marks are indicated in [ ] after each question.
4. Rough Work should be done separately, not in the answer sheet.
5. **Answers should be reasoned and derived clearly, not a single word answer**.
6. You are required to write the answers in **A4** sheets.
7. Preferably use a ballpoint pen. The writing should be **readable after scanning**. (This is very important)
8. This is a proctored exam. You need to keep your video on throughout the exam.
9. After finishing the writing part, you are expected to submit the **scanned copy of the hand written answer sheets in one consolidated PDF format to the provided link**. Link will be provided to upload the pdf.
10. Copying in any form will be dealt strictly. Both "copied to" and "copied from" will be penalized.

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1. Find the limit if the following sequence converges, otherwise prove that it does not converge.
   $a_n = \frac{sin\ (n^2+1)}{n^2+1} - n^2 + \sqrt{n^4+n^2}$ [3]
2. Determine whether or not the following series converges:
   $\sum_{n=1}^{\infty} \frac{5n^2-3n+4}{n^3+5n}$ [4]
3. Find out whether the sequence of functions provided below converges pointwise on $[-1,1]$ to a function or not.
   $f_n(x) = \frac{x\ cos\ x}{n^2} + 2x + sin\frac{1}{n}$. [3]
4. Find a solution of the equation $x^4 + 4x^3 + 6x^2 - x - 3 = 0$ using bisection method. Perform 4 iterations only. [3]
5. Solve the following: [3+4]

   a. Apply Interpolation and compute the value of $\sqrt{5.75}$. Given that $\sqrt{5}$ =2.236, $\sqrt{6}$ =2.449, $\sqrt{7}$ =2.646 and $\sqrt{8}$ =2.828 correct up to three decimal places

   b. Evaluate approximately by composite trapezoidal rule $\int_0^1 (2x - 3x^2)dx$ by taking 6 sub intervals. Compute the exact integral and find the absolute error.