Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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|  |  |  |  |
| **Code :** | **17MA1003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **BASIC MATHEMATICS FOR SCIENCES** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Prove that | CO1 | 10 |
| b. | Prove that | CO1 | 10 |
| **(OR)** | | | | |
| 2. | a. | Ifprove that | CO1 | 10 |
| b. | Prove that | CO1 | 10 |
|  |  |  |  |  |
| 3. | a. | If n is a positive integer, prove that . | CO1 | 10 |
| b. | Find the real values of *x* and *y* if | CO1 | 10 |
| **(OR)** | | | | |
| 4. | a. | Find all the values of . | CO1 | 10 |
| b. | Find the square root of . | CO1 | 10 |
|  |  |  |  |  |
| 5. | a. | Find the Eigen values and Eigen vectors of the matrix. | CO2 | 15 |
| b. | Find the rank of the matrix | CO2 | 5 |
| **(OR)** | | | | |
| 6. | a. | Verify Cayley-Hamilton theorem for the matrix  and hence find *A4.* | CO2 | 15 |
| b. | Investigate the consistency of the following system of equations, *2x+3y=1, x 2y=4, 4x y=9.* | CO2 | 5 |
|  |  |  |  |  |
| 7. | a. | Calculate mean, median and mode of the following data:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Class | 10– 15 | 15–20 | 20–25 | 25 –30 | 30 – 35 | 35 – 40 | | Freq. | 2 | 28 | 125 | 270 | 303 | 197 | | Class | 40– 45 | 45– 50 | | Freq. | 65 | 10 | | CO3 | 15 |
| b. | Find the rank correlation co-efficient for the following data.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Rank in X | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | Rank in Y | 4 | 3 | 1 | 2 | 6 | 5 | 7 | | CO3 | 5 |
| **(OR)** | | | | |
| 8. | a. | The following are scores of two batsmen A and B in a series of innings:   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | A | 12 | 115 | 6 | 73 | 7 | 19 | 119 | 36 | 84 | 29 | | B | 47 | 12 | 16 | 42 | 4 | 51 | 37 | 48 | 13 | 0 |   Who is the better score getter and who is more consistent? | CO3 | 10 |
| b. | Psychological tests for intelligence and engineering ability were applied to 10 students. Here is a record of ungrouped data showing intelligence ratio (I.R) and engineering ratio (E.R). Calculate the co-efficient of correlation.   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | I.R | 105 | 104 | 102 | 101 | 100 | 99 | 98 | 96 | 93 | 92 | | E.R | 101 | 103 | 100 | 98 | 95 | 96 | 104 | 92 | 97 | 94 | | CO3 | 10 |
|  | | **Compulsory**: |  |  |
| 9. | a. | A lot consists of 10 good articles, 4 with minor defects and 2 with major defects. Two articles are chosen from the lot at random (without replacement). Find the probability that (i) both are good (ii) both have major defects (iii) at least 1 is good (iv) at most 1 is good (v) exactly 1 is good. | CO5 | 10 |
| b. | In a bolt factory machines A, B and C manufacture respectively 25%, 35% and 40% of the total. Of their output 5, 4, and 2 percents are defective bolts. A bolt is drawn at random from the product and it is found to be defective. What are the probabilities that it was manufactured by machine B? | CO6 | 10 |