**Regulations:**

**A18**



**H.T No**

**Sreenidhi Institute of Science and Technology**

(An Autonomous Institution)

**Code No: 7HC07 Date: 07-Jan-2020 (FN)**

**B.Tech I-Year I-Semester External Examination, Jan-2020 (Regular)**

**MATHEMATICS - I (CSE, IT and ECM)**

**Time: 3 Hours Max.Marks:70**

***Note: a****) No additional answer sheets will be provided.*

*b) All sub-parts of a question must be answered at one place only, otherwise it will not be valued.*

*c) Missing data can be assumed suitably.*

**Part - A Max.Marks:20**

**Answer all QUESTIONS.**

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| --- | --- | --- |
| 1. | State Cauchy’s mean value theorem. | [2M] |
| 2. | Find the value of | [2M] |
| 3. | For what values of x, the following matrix is singular? | [2M] |
| 4. | If A is a Hermitian matrix, show that iA is Skew- Hermitian. | [2M] |
| 5. | T is a linear map from defined by the relation  Tx =Ax, find Tx when x is. | [2M] |
| 6. | Define the inner product of two vectors in Euclidean space. | [2M] |
| 7. | Find Taylors series of sinx. | [2M] |
| 8. | Express the matrix  as the sum of symmetric and skew-symmetric matrices. | [2M] |
| 9. | Define vector space. | [2M] |
| 10. | Show that β(m,n) =β(m+1,n)+β(m,n+1). | [2M] |

**Part – B Max.Marks:50**

**ANSWER ANY FIVE QUESTIONS. EACH QUESTION CARRIES 10 MARKS.**

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| 11. | a) | Verify the Rolle’s theorem for the function f(x)=(x-a)m(x-b)n in [a,b] | [5M] |
|  | b) | Apply mean value theorems show that  . | [5M] |
|  |  |  |  |
| 12. | a) | Find the evolute of the parabola | [5M] |
|  | b) | **)** Prove thatwhere q >0 p>0. | [5M] |
|  |  |  |  |
| 13. | a) | Show that the equations 3x + 4y +5z =a; 4x +5y +6z =b; 5x + 6y +7z =c do not have a solution unless a + c = 2b. | [5M] |
|  | b) | . Show that A = is orthogonal then find the value of. | [5M] |
|  |  |  |  |
| 14. | a) | . Prove that the matrix  is unitary. | [5M] |
|  | b) | Find the Eigen values and Eigen Vectors of A= . | [5M] |
|  |  |  |  |
| 15. | a) | Determine the matrix of the linear map T: , T(x, y, z) = (y + z, y - z) with respect to the ordered basis. | [5M] |
|  | b) | Determine whether or not the set {+t+1} spans V the vector space of all polynomial of degree3. | [5M] |
|  |  |  |  |
| 16. | a) | In the inner product space with standard inner product, if the set S = {(1,1,0),(1,-1,1),(-1,1,2)} is an orthogonal set, then find equivalent orthonormal set? | [6M] |
|  | b) | Define an orthogonal complement. | [4M] |
|  |  |  |  |
| 17. | a) | Explain about Geometrical interpretation of Lagrange’s theorem. | [4M] |
|  | b) | Find envelope of the family of lines y = mx +, m being the parameter. | [3M] |
|  | c) | Find the rank of the matrix A =by reducing into Normal form. | [3M] |
|  |  |  |  |
| 18. | a) | Verify the Cayley- Hamilton theorem for the matrix  A =  and find its inverse by using Cayley –Hamilton theorem. | [4M] |
|  | b) | Define a basis for vector space. | [3M] |
|  | c) | Show that the set{(-1,1,0),(1,1,0),(0,0,1)} is an orthogonal set. | [3M] |

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