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| **Estd : 1995**   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  |  |  |   Reg. No:  **SETHU INSTITUTE OF TECHNOLOGY, KARIAPATTI**  **(An Autonomous Institution, Affiliated to Anna University, Chennai)**  Regulation - 2015 | | | | | | | | | | |
| **B.E/B.TECH DEGREE END SEMESTER EXAMINATIONS – NOV 2017** | | | | | | | | | | |
| **SEMESTER I** | | | | | | | | | | |
| **COMMON TO ALL BRANCHES** | | | | | | | | | | |
| **15UMA102 – MATHEMATICS I** | | | | | | | | | | |
| **Answer ALL questions** | | | | | | | | | | |
| **Duration: 3 Hours** | | | | | **Maximum: 100 Marks** | | | | | |
| **PART -- A (10 x 1 = 10 Marks)** | | | | | | | | | | |
| 1. | | The value of is | | | | | | | | |
|  | | A. Undefined | | | | B. | C. Infinity | D. Zero | | |
| 2. | | Suppose . If is continuous at x=0, then the value of ‘k’ is | | | | | | | | |
|  | | A. -1 | | | | B. 1 | C. | D. | | |
| 3. | | If , then by Euler’s theorem the value of is | | | | | | | | |
|  | | A. 2u | | | | B. u | C. 3u | D. 0 | | |
| 4. | |  | | | | | | | | |
|  | | A. 3 | | | | B. 6 | C. | D. -6 | | |
| 5. | | Value of is | | | | | | | | |
|  | | A. | | | | B. | C. | D. | | |
| 6. | | Suppose V represent a sphere of radius 1 in the space. Then the value of the integral   is | | | | | | | | |
|  | | A. | | | | B. | C. | D. | | |
| 7. | | Value of the double integral is | | | | | | | | |
|  | | A. 0 | | | | B. | C. | D. | | |
| 8. | | While changing Cartesian coordinates to polar coordinates in double integration, is changed into | | | | | | | | |
|  | | A. | | | | B. | C. | D. | | |
| 9. | | If is an eigen vector of the matrix , then the corresponding eigen value is | | | | | | | | |
|  | | A. -2 | | | | B. -1 | C. 1 | D. 2 | | |
| 10. | | If the product of two eigenvalues of third order singular matrix A is 34, then the third eigenvalue of the matrix A is | | | | | | | | |
|  | | A. 3 | | | | B. -1 | C. 1 | D. 0 | | |
| **PART -- B (5 x 2 = 10 Marks)** | | | | | | | | | | |
| 11. | | | State Leibnitz’s theorem to find nth derivative of product of two functions. | | | | | | | |
| 12. | | | Write down the Taylor’s formula to in powers of x and y. | | | | | | | |
| 13. | | | Prove that | | | | | | | |
| 14. | | | Change the order of integration in | | | | | | | |
| 15. | | | If the sum of two eigenvalues and trace(=sum of diagonal) of a 3X3 matrix A are equal, find the value of . | | | | | | | |
| **PART -- C ( 5 x 16 = 80 Marks)** | | | | | | | | | | |
| 16. | | (a) | | | (i) Find | | | | | 4 |
| (ii) Evaluate | | | | | 4 |
| (iii) Expand upto the term containing , using Maclaurin’s series. | | | | | 8 |
| **OR** | | | | | | | | | | |
|  | | (b) | | | (i) Suppose . Using chain rule of differentiation, prove that | | | | |  |
| (ii) Prove by Leibnitz’s theorem, if then | | | | | 8 |
|  | | | | | | | | | | |
| 17. | | (a) | | | (i) Verify Euler’s theorem for the function | | | | | 8 |
| (ii) Find the Jacobian of with respect to , if | | | | | 8 |
| **OR** | | | | | | | | | | |
|  | | (b) | | | Given the transformation and that is a function of and and also of and , prove that | | | | | 16 |
|  | | | | | | | | | | |
| 18. | | (a) | | | (i) Evaluate by means of integration by parts | | | | | 4 |
| (ii) Evaluate | | | | | 4 |
| (iii) Prove that | | | | | 8 |
| **OR** | | | | | | | | | | |
|  | | (b) | | | (i) If , prove that its reduction formula is | | | | | 8 |
| (ii) Evaluate in terms of Gamma function and   hence find | | | | | 8 |
|  | | | | | | | | | | |
| 19. | | (a) | | | (i)Change the order of integration and hence evaluate | | | | | 8 |
| (ii)Evaluate where | | | | | 8 |
| **OR** | | | | | | | | | | |
|  | | (b) | | | (i)Change into Polar co-ordinates and evaluate | | | | | 8 |
| (ii)Find the area of the region D bounded between the curves and | | | | | 8 |
|  | | | | | | | | | | |
| 20. | | (a) | | | (i) Find the eigenvalues and eigenvectors of the matrix | | | | | 8 |
| (ii)Using Cayley Hamilton theorem, find the value of the matrix  , . | | | | | 8 |
| **OR** | | | | | | | | | | |
|  | | (b) | | | Reduce the quadratic form to canonical form by means of orthogonal reduction and hence show that is positive semi-definite. Give also a set of values which makes the given quadratic form zero. | | | | | 16 |