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 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 |