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| **Subject** | **Mathematics-I** | **Calculus-I** |
| **Subject Code** | **18BS1MA01** |

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| Sl No | **Questions** | CO’s | Marks |
| 1. | 1. State Rolle’s Theorem and explain its geometrical interpretation. | CO1 | 5 |
| 2. | 1. State and Prove Lagrange’s Mean Value Theorem and explain its geometrical interpretation. | CO1 | 10 |
| 3. | 1. State and Prove Cauchy’s Mean Value Theorem. | CO1 | 5 |
| 4. | Verify Rolle’s Theorem for the following functions in the given intervals | | |
|  | i)  in | CO1 | 5 |
|  | ii)  in | CO1 | 5 |
|  | iii)  in | CO1 | 5 |
| 5. | Verify Lagrange’s Mean Value Theorem for the following functions in the given intervals | | |
|  | i) in | CO1 | 5 |
|  | ii) in | CO1 | 5 |
|  | iii) in | CO1 | 5 |
| 6. | Verify Cauchy’s Mean Value Theorem for the following functions in the given intervals | | |
|  | i) in | CO1 | 5 |
|  | ii) in | CO1 | 5 |
|  | iii) in | CO1 | 5 |
| 7. | Show that the constant ‘*c*’ of Cauchy’s Mean Value Theorem for the function in the interval *a, b* is the harmonic mean between *a* and *b* |  |  |
| 8. | 1. If , prove tha | CO1 | 7 |
| 9. | 1. Employing the Lagrange’s Mean Value Theorem, prove that where. | CO1 | 7 |
| 10. | 1. If, prove that (by taking ). | CO1 | 7 |
| 11 | 1. Expand in powers of  up to the fourth degree terms. | CO1 | 5 |
| 12. | 1. Find the Taylor’s series expansion for about the point . | CO1 | 5 |
| 13. | Expand in powers of  up to the term containing fourth degree | CO1 | 5 |
| 14. | Expand  in ascending power of *h* up to the term containing  and hence deduce an approximation value of . | CO1 | 5 |
| 15. | Expand in powers of  up to the term containing fourth degree and hence obtain . | CO1 | 5 |
| 16. | Obtain the Maclaurin’s series expansion of the following functions | | |
|  | (i)  (ii)  (iii)  (iv)  (v) | CO1 | 5 each |
| 17. | Evaluate the following limits | | |
|  | (i)  (ii)  (iii)  (iv)  (v)  (vi) | CO1 | 5 each |
| 18. | Evaluate the following limits | | |
|  | (i)  (ii)  (iii)  (iv)  (v)  (vi) | CO1 | 5 each |
| 19. | 1. Find the value of so that is finite and also find the limit. | CO1 | 5 |
| 20. | Find the values of ‘a’ and ‘b’ such that . | CO1 | 5 |