LR23

Course Code: U23MA101

# LORDS INSTITUTE OF ENGINEERING AND TECHNOLOGY

**(UGC AUTONOMOUS)**

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## B.E I- SEMESTER END EXAMINATION (Regular) –Feb-2024

## Course: MATHEMATICS-I

**Common to All Branches**

***Time:* 3 *Hours*** **Date: 19-02-2024** ***Max. Marks:* 60**

Bloom's Taxonomy Levels (***BTL***)

| 1. Remember | 2. Understand | 3. Apply | 4. Analyze | 5. Evaluate | 6. Create |
|---|---|---|---|---|---|

Note: Question No. 1 is compulsory
Answer any 4 questions from Q.No.2 – Q.No.7

| Q.No. | Question | Marks | CO | BTL |
|---|---|---|---|---|
| 1. | a. Test for convergence of $\sum\frac{1}{2^n}$. | [2] | CO1 | BTL3 |
| | b. Write the Taylor's Series Expansion of $f(x) = e^x$ about x=1 | [2] | CO2 | BTL2 |
| | c. Evaluate the $\lim_{(x,y)\to(1,1)} \frac{x(y-1)}{y(x-1)}$, if it exists | [2] | CO3 | BTL4 |
| | d. Evaluate $\int_0^1 \int_0^3 (x^2+y^2)dydx$ | [2] | CO4 | BTL3 |
| | e. State Green's theorem on a plane. | [2] | CO5 | BTL1 |
| | f. Find the directional derivative of the function $\phi = x^2yz+4xz^2$ at (1, -2, -1) in the direction of 2i-j-k. | [2] | CO5 | BTL2 |
| 2. | a. Write the statement of P-Series and Give one Example. | [3] | CO1 | BTL1 |
| | b. Test for convergence of the series $\sum\sqrt{n^4+1} - n^2$. | [9] | CO1 | BTL4 |
| 3. | State and prove Rolle's theorem. | [12] | CO2 | BTL4 |
| 4. | a. If $u = \frac{yz}{x}, v = \frac{zx}{y}, w = \frac{xy}{z}$, show that $\frac{\partial(u,v,w)}{\partial(x,y,z)} = 4$. | [6] | CO3 | BTL4 |
| | b. Find the minimum value of $x^2+y^2+z^2$ with the constraint x + y + z = 3a. | [6] | CO3 | BTL2 |
| 5. | a. Evaluate $\int_0^{\ln c}\int_0^{\ln b}\int_0^{\ln a} e^{x+y+z}\,dxdydz$ | [6] | CO4 | BTL3 |
| | b. Evaluate $\int_0^{\infty}\int_x^{\infty}\frac{e^{-y}}{y}dydx$ by changing the order of integration | [6] | CO4 | BTL4 |
| 6. | Use Gauss divergence theorem to evaluate $\iint (yz^2\,i + zx^2\,j + 2z^2k).\bar{n}\,ds$, where S is the closed surface bounded by the xy-plane and the upper half of the sphere $x^2+y^2+z^2=a^2$ above this plane. | [12] | CO5 | BTL4 |
| 7. | a. Test for convergence of the series $\sum_{n=1}^{\infty}\frac{x^{n-1}}{n.3^n}$ | [6] | CO1 | BTL4 |
| | b. Evaluate $\oint xdy - ydx$ where c is the triangle with vertices (0, 0), (2,0) and (0,1) using Green's theorem. | [6] | CO5 | BTL4 |

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