**Code No.BS101HS**

**METHODIST COLLEGE OF ENGINEERING & TECHNOLOGY**

**(An Autonomous Institution)**

**B.E. (CIVIL/CSE/EEE/ECE/MECH/AI&DS) I-Semester (AICTE) Examination, March-2023**

**Subject: ENGINEERING MATHEMATICS-I**

**Time: 3 hours Max.Marks:60**

**Note: Missing data, if any, maybe suitably assumed.**

**PART-A**

**Answer All the questions.**

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| **Q.No.** | **Questions** | **Marks** | **CO** | **BTL** |
| **1. a** | **State Caley-Hamilton Theorem?** | **2** | **1** | **L1** |
| **b** | **Examine whether the following vectors are linearly dependent or not?**  **(3,1,2), (2,1,4),(1,1,1)** | **2** | **1** | **L2** |
| **c** | **State Rolle’s Theorem?** | **2** | **2** | **L1** |
| **d** | **What are the Evolutes and Involutes?** | **2** | **2** | **L1** |
| **e** | **Evaluate the following** | **2** | **3** | **L3** |
| **f** |  | **2** | **3** | **L2** |
| **g** | **Evaluate** | **2** | **4** | **L1** |
| **h** | **Write the conversion to change to polar coordinates.** | **2** | **4** | **L1** |
| **i** | **What is solenoidal vector?** | **2** | **5** | **L3** |
| **j** | **State stoke’stheorem.** | **2** | **5** | **L2** |

**PTO**

**PART-B**

**Answer Any Five questions**.

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| **Q.No.** |  | **Questions** | **Marks** | **CO** | **BTL** |
| **2.** | **a** | **Find the eigen values and eigen vectors of the matrix** | **8** | **1** | **L4** |
| **b** | **Reduce 8x2 + 7y2 + 3z2 – 12xy+4xy-8yz into canonical form by orthogonal transformation?** |  | **1** | **L2** |
| **3.** | **a** | **Verify lagrange’s mean value theorem for the function  f(x)=x3-6x2+11x -6 in [ 0,4].** | **8** | **2** | **L2** |
| **b** | **Find the radius of curvature at any point on the parabola y2 = 4ax.** |  | **2** | **L2** |
| **4.** | **a** | **Investigate the function x3 + y3 – 3axy for maxima and minima .** | **8** | **3** | **L1** |
| **b** | **If z(x+y) = x2+y2 , show that -** |  | **3** | **L3** |
| **5.** | **a** | **Evaluate the following triple integral** | **8** | **4** | **L4** |
| **b** | **Evaluate the following integral by changing the order of integration** |  | **4** | **L5** |
| **6.** | **a** | **If F = (5xy – 6x2 ) i +(2y-4x)j , evaluate . along the curve C in the xy plane y = x3 from the point (1,1) to (2,8).** | **8** | **5** | **L4** |
| **b** | **Apply Green’s theorem to evaluate , where C is the plane triangle enclosed by the lines y=0, x= and**  **y= x** |  | **5** | **L2** |
| **7.** | **a** | **Find the rank of the matrix using echelon form A=** | **8** | **1** | **L1** |
| **b** | **Verify cauchy’s mean value theorem for the functions f(x) = and g(x) = 1/ in [a,b].** |  | **2** | **L1** |
| **8.** | **a** | **Change the variables from cartesian to polar coordinates and evaluate** | **8** | **3** | **L3** |
| **b** | **If u = , v = x + y , find .** |  | **4** | **L2** |
| **9.** | **a** | **Prove that div(rn) = (n+3)rn, hence show that is solenoidal.** | **8** | **5** | **L3** |
| **b** | **Find divF and Curl F where F = grad ( x2 +y2 + z2 -3xyz).** |  | **5** | **L2** |

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