DEPARTMENT OF MATHEMATICS

NATIONAL INSTITUTE OF TECHNOLOGY KURUKSHETRA

B.Tech. Second Semester (**CE/EE/ECE/ME/PI**) **Mid Term – II Examination**

Integral Calculus and Difference Equations (MAIC 102) **Max. Marks**: 20 **Time**: 8:30 am – 9:20 am

Note: Answer all the questions. Calculator is not allowed into the examination hall.

Q1.	Using the change of variables $u = x - y$, v = x+y, evaluate the integral $\iint_R (x-y)e^{x^2-y^2}\,dA$, where R is the region bounded by the lines $x + y = 1$, x+y = 3 and the curves $x^2 - y^2 =$ -1, $x^2 - y^2 = 1$.	(6M)
Q2.	Using Gamma function, evaluate $\int_0^\infty x^6 e^{-4x^2}\,dx$.	(4M)
Q3.	Find the rate of change of $\phi = xyz$ in the direction normal to the surface $x^2y + y^2x + yz^2 = 3$ at the point (1, 1, 1).	(4M)
Q4.	Verify Greens theorem in a plane for $\oint_C \left[(3x^2 - 8y^2)dx + (4y - 6xy)dy\right]$ where C is the boundary of the region defined by $y = \sqrt{x}$ and $y = x^2$.	(6M)