DIT UNIVERSITY DEHRADUN	
B.Tech. (All)	**END TERM EXAMINATION, EVEN SEM 2020-21 (SEMESTER I)**
Subject Name: Engg. Mathematics I (MAF101)	
Time: 1:00 Hours	**Total Marks: 50**

Note: All questions are compulsory.

Q.1)		Obtain Taylor's series expansion of the maximum order for the function $f(x,y) = x^2 + 3y^2 - 9x - 9y + 31$ about the point $(2,1)$ and hence find $f(2.1, 0.9)$
		[1 x 10= 10]
Q.2)		If $\log y = \tan^{-1} x$ then show that $(1+x^2)y_{n+2} - (2nx + 2x - 1)x\, y_{n+1} + n(n+1)y_n = 0.$
		[1 x 10= 10]
Q.3)		If $(x,y) = \sin^{-1}\left\{\frac{x+y}{\sqrt{x}+\sqrt{y}}\right\}$. Examine whether $u(x,y)$ is homogeneous or not. Further, show that $x^2\frac{\partial^2 u}{\partial x^2} + 2xy\frac{\partial^2 u}{\partial x\,\partial y} + y^2\frac{\partial^2 u}{\partial y^2} = \frac{\sin u \cos 2u}{4\cos^3 u}$.
		[1 x 10= 10]
Q.4)		Evaluate the integral $\int_0^{\log 2}\int_0^x\int_0^{x+\log y} e^{x+y+z}\, dz\, dy\, dx$.
		[1 x 10= 10]
Q.5)		Evaluate curl and divergence of the vector $\hat{v} = e^{xy}(x\hat{\imath} + yj) + 2\, e^z\hat{k}$ and check whether it is solenoidal and/or irrotational.
		[1 x 10= 10]

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