USN 1CD18CS106

CAMBRIDGE INSTITUTE OF TECHNOLOGY

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Department of Basic Sciences

First Internal Assessment - Even Semester 2018-19

Sub. Name: Advanced Calculus & Numerical Methods **Sub. Code**: 18MAT21 **Semester**: II

Date: 30-03-2019 **Time:** 9:00 AM **Duration**: 90 Minutes **Max. Marks**: 30

[**Instructions**: Answer any two full questions as indicated below]

Sl. No	QUESTIONS	COs	RBT Levels	Marks
1.	a) Find the directional derivative for the surface $\phi = x^2yz+4xz^2$ along the vector $2i-j-2k$ at (1, -2, -1).	CO1	L1	04M
	b) If $\vec{F} = grad\left(x^3+y^3+z^3-3xyz\right)$ then determine $div\,\vec{F}$ and $curl\,\vec{F}$.	CO1	L2	05M
	c) Determine the value of the constants a, b, c so that the vector function $\vec{F} = (x+y+az)i+(bx+2y-z)j+(x+cy+2z)k$ is irrotational. Also find its scalar potential ϕ such that $\vec{F} = \nabla\varphi$.	CO1	L3	06M
	OR			
2.	a) Find the angle between the normals to the surface $x^2+y^2-z^2=4$ and $z=x^2+y^2-13$ at $(2,1,2)$.	CO1	L1	04M
	b) If $\vec{F} = (x+y+1)i+j-(x+y)k$ prove that $\vec{F}\cdot curl\,\vec{F}=0$.	CO1	L2	05M
	c) If $\vec{V} = 3xy^2z^2\,i+y^3z^2\,j-2y^2z^3\,k$ prove that $\vec{V}$ is solenoidal.	CO1	L3	06M
3.	a) Find the solution of $\frac{d^2y}{dx^2}-4\frac{dy}{dx}+4y=e^{2x}+\cos x+4$.	CO2	L1	04M
	b) Determine the solution of $\frac{d^2y}{dx^2}+y=\tan x$ by the method of variation of parameter.	CO2	L2	05M
	c) Solve $x^2\frac{d^2y}{dx^2}-3x\frac{dy}{dx}+4y=(1+x)^2$.	CO2	L3	06M

	OR			
4.	a) Find the solution of $\frac{d^3y}{dx^3}-6\frac{d^2y}{dx^2}+11\frac{dy}{dx}-6y=3e^x$.	CO2	L1	04M
	b) Determine the solution of $(2x+1)^2y''-6(2x+1)y'+16y=8(2x+1)^2$.	CO2	L2	05M
	c) Solve $\frac{d^2y}{dx^2}+y=\sec x\tan x$ by the method of variation of parameter.	CO2	L3	06M

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