Vivekananda College of Engineering & Technology, Puttur
[A Unit of Vivekananda Vidyavardhaka Sangha Puttur ®]
Affiliated to VTU, Belagavi & Approved by AICTE New Delhi

CRM08	Rev 1.11	BS	27/07/22

CONTINUOUS INTERNAL EVALUATION - 2

Dept: BS	Sem / Div: II / A, B, C, D, E, F	Sub: Advanced Calculus and Numerical Methods	S Code: 21MAT21
Date: 03/08/2022	Time: 9:30-11:00	Max Marks: 40	Elective: N

Note: Answer any 2 full questions, choosing one full question from each part.

QN		Questions	Marks	RBT	CO's
		PART A			
1	a	Find the directional derivative of $\phi = 4xz^3 - 3x^2y^2z$ at (2, -1, 2) along $2\hat{i} - 3\hat{j} + 6\hat{k}$	6	L2	CO2
	b	If $\vec{F} = \nabla(xy^3z^2)$ find div $\vec{F}$ and curl $\vec{F}$ at (1, -1, 1)	7	L2	CO2
	c	Show that $\vec{F} = (x^2 - yz)\hat{i} + (y^2 - zx)\hat{j} + (z^2 - xy)\hat{k}$ is irrotational and find its scalar potential.	7	L3	CO2
		OR			
2	a	If $\vec{F} = 3x^2\hat{i} + (2xz - y)\hat{j} + z\hat{k}$ Find the work done in moving a particle along the curve $x^2 = 4y, 3x^3 = 8z$ from x=0 to x=2	6	L2	CO2
	b	Apply Green's theorem to evaluate $\int_c (xy + y^2)dx + x^2dy$ where c is the closed curve bounded by $y = x$ and $y = x^2$	7	L3	CO2
	c	Using Stoke's theorem, evaluate $\int_c \vec{F} \cdot d\vec{r}$ for $\vec{F} = (x^2 + y^2)\hat{i} - 2xy\hat{j}$ where c is the rectangle bounded by the lines x= a, x= -a, y= 0 and y= b	7	L3	CO2

		PART B			
3	a	Form the partial differential equation from $\phi(x^2+y^2, z-xy)=0$	6	L1	CO3
	b	Solve $\frac{\partial^2 z}{\partial x^2}+z=0$ given x=0, $z=e^y$ and $\frac{\partial z}{\partial x}=1$	7	L2	CO3
	c	Derive one- dimensional wave equation $\frac{\partial^2 u}{\partial t^2}=c^2\frac{\partial^2 u}{\partial x^2}$	7	L3	CO3
		OR			
4	a	Form the partial differential equation from the relation $z=f(x+ay)+g(x-ay)$	6	L1	CO3
	b	Solve $\frac{\partial^2 z}{\partial x^2}=xy$ subject to the conditions that $\frac{\partial z}{\partial x}=\log(1+y)$ when x=1 and z=0 when x=0	7	L2	CO3
	c	Solve $x(y-z)p+y(z-x)q=z(x-y)$	7	L2	CO3

MRPai 27/7/22

Prepared by: Prof. Madhavi R Pai

HOD: Prof. M Ramananda Kamath 27/7/22