CRM08	Rev 1.10	‹BS›	‹11/03/2022›

CONTINUOUS INTERNAL EVALUATION - 2
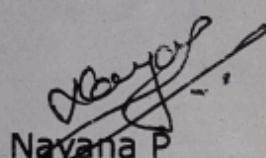
Dept: BS	Sem / Div: III/A,B	Sub: ADDITIONAL MATHEMATICS I	S Code: 18MATDIP31
Date:14/03/2022	Time:3.50-5.00 pm	Max Marks: 50	Elective: N
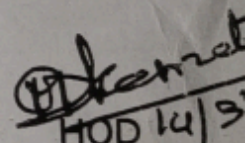
Note: Answer any 2 full questions, choosing one full question from each part.

QN	Questions	Marks
	PART A	
1 a	Obtain the Maclaurin's series expansion of tanx	8
b	If $u = e^{ax+by} f(ax - by)$ prove that $b\dfrac{\partial u}{\partial x} + a\dfrac{\partial u}{\partial y} = 2abu.$	8
c	If $u = \tan^{-1}\left(\dfrac{x^3 + y^3}{x + y}\right)$, prove that $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} = \sin 2u.$	9
	OR	
2 a	Prove that $\sqrt{1 + \sin 2x} = 1 + x - \dfrac{x^2}{2} - \dfrac{x^3}{6} + \dfrac{x^4}{24} + \cdots\cdots$	8
b	If $z = \tan^{-1}\left(\dfrac{x^2 + y^2}{x + y}\right)$, find $\dfrac{\partial z}{\partial x}$ & $\dfrac{\partial z}{\partial y}.$	8
c	If $u = \sin^{-1}\left(\dfrac{x^2 y^2}{x + y}\right)$, prove that $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} = 3\tan u.$	9
	PART B	

3 a If $x = u(1-v)$, $y = uv$, find $J = \dfrac{\partial(x, y)}{\partial(u, v)}$		8
b If $z = xy^2 + x^2 y$ where $x = at$, $y = 2at$, find $\dfrac{dz}{dt}$		8
c If $u = f(y-z, z-x, x-y)$ prove that $\dfrac{\partial u}{\partial x} + \dfrac{\partial u}{\partial y} + \dfrac{\partial u}{\partial z} = 0$		9
OR		
4 a If $x = r\cos\theta$, $y = r\sin\theta$ find $J = \dfrac{\partial(x, y)}{\partial(r, \theta)}$		8
b If $u = xy + yz + zx$, where $x = t\cos t$, $y = t\sin t$, $z = t$, find du/dt at $t = \pi/4$.		8
c If $z = f(x,y)$ where $x = e^u \sin v$, $y = e^u \cos v$ then prove that $\left(\dfrac{\partial z}{\partial u}\right)^2 + \left(\dfrac{\partial z}{\partial v}\right)^2 = e^{2u}\left\{\left(\dfrac{\partial z}{\partial x}\right)^2 + \left(\dfrac{\partial z}{\partial y}\right)^2\right\}$		9

Prepared by: Nayana P

HOD 14/3