B.Sc.Sem IV EXAMINATION: 21 SEP 2019

PAPER NO.:MAT-CC-403

ADVANCED CALCULUS II

CODE NO: 21016/21037

TIME:2:30 HOURS

INSTRUCTIONS(1)ALL QUESTIONS ARE COMPULSORY.

(2)EACH QUESTION CARRY EQUAL MARKS

TOTAL MARKS:70

Q.1	A	Prove :div(curl f)=0 for f=(x^2yz, xy^2z, xyz^2)	[7]
	B	Prove : grad $\left(\frac{\phi}{\psi}\right) = \frac{\psi \text{grad}\phi - \phi \text{grad}\psi}{\psi^2}$	[7]
		OR	
Q.1	A	Prove :div(f ×g) = g.curlf –f. curlg. for f = (f_1,f_2,f_3) and g = (g_1, g_2 , g_3).	[7]
	B	If f(x,y,z) = $3xy^2 + 2x^2yz$ and g(x,y,z) = $2x^2y - xy^2$, find grad (f g) at point (2,1,-1).	[7]
Q.2	A	Obtain formula of radius of curvature of curve : y = f (x).	[7]
	B	Obtain radius of curvature of curve : r = a (1 – cos θ) .	[7]
		OR	
Q.2	A	Obtain formula of radius of curvature of curve : r = f(θ)	[7]
	B	Find the radius of curvature of $2x^3 - 3x^2y + 4xy^2 - y^3 + 5x^2 - 7xy - 8y = 0$ at origin	[7]
Q.3	A	State and prove Green's theorem.	[10]
	B	Evaluate: $\iiint_s$ dxdydz Where s = [0,a]×[0,b]×[0,c].	[4]
		OR	
Q.3	A	State and prove Stoke's curl theorem	[10]
	B	Evaluate : $\int_0^1 \int_0^2 (x^2 + y^2)dxdy$.	[4]
Q.4	A	Find P.D.E of $(1 + b^3)z = 8(x + by + a)^3$	[7]
	B	Find general solution of the P.D.E : y(x+z)p + $(z^2 - 2xz - x^2)$ q = y (x-z).	[7]
		OR	
Q.4	A	Find P.D.E. of z = xy + f ($x^3 - y^3$).	[7]
	B	Find general solution of the P.D.E : 2xyp + (x^2+y^2) q = (x+y)z.	[7]
Q.5	A	Classify the following PDEs : 1) $U_{xx} + 4U_{xy} + 4U_{yy} = 0$ 2) $U_{xx} + U_{yy} = U_{zz}$	[7]
	B	Solve : 1) $(2D^2 + 5DD' + 2D'^2)Z = 0$ 2) $(D^3D'^2 + D^2D'^3)Z = 0$	[7]
		OR	
Q.5	A	Find the characteristics of $4U_{xx} + 5U_{xy} + U_{yy} + U_x + U_y = 2$.	[7]
	B	Solve : $(D^4 - 2D^3D' + 2DD'^3 - D'^4)Z = 0$	[7]