GIET UNIVERSITY, GUNUPUR – 765022

M. Sc. (Second Semester) Examinations, September – 2021

20MTPC202 – Advanced Calculus

(Mathematics)

Time: 2 hrs Maximum: 50 Marks

(The figures in the right hand margin indicate marks.)

PART – A

Q.1. Answer ***ALL*** questions **(2 x 10 = 20 Marks)**

a. Prove that $D_{-\beta}$ f(p_o)= - D_{β} f(p_o)

b. State the Taylors theorem for two variables.

c. Find the partial derivative of function f(x,y,z)= $x^2y + y^3\sin z^2$, Find f_1, f_2 ,f_3.

d. Compute Df for each of the following functions at the given point f(x,y) = x sin xy at $(\frac{\pi}{4}, 2)$

e. Find the inverse transformation of T : $u=x+y$, $v = 2xy^2$

f. Find the linear function L such that L(1,0,0)=2, L(0,1,0)=-1 L(0,0,1)=2

g. Define Functional Dependent

h. What is the significance of Gauss divergence theorem?

i. Find the unit normal vector to the right circular cylinder

j. Change the order of the integration $\int_0^2\int_0^y f(x,y)dxdy$

PART – B (6 x 5 = 30 Marks)

<u>Answer ***ANY FIVE*** questions</u> Marks

2. State and prove mean value theorem. (6)

3. (i) If $F(x,y,z,w)=x^2y - xz - 2yw^2$ find the derivative of F at (1,1,-1,1) in the direction β=(4/7,-4/7,1/7,-4) 3+3

   (ii) Compute D_f for each of the following functions at the given point f(x,y) = $x^2yz+3xz^2$ at (1,2,-1)

4. Let T be a transform from R^n in to R^m ,which is of class c^I in an open set D and suppose that J(p) $\neq$ 0 for each p$\in$ D then T is locally one to one in D. (6)

5. State and prove implicitly function theorem. (6)

6. Let L be a linear transform of R^3 to R^3 describe by T : u=f(x,y,z) ,v= g(x,y,z), w= h(x,yx,z), which of class c^I in an open set D and suppose that at each point p$\in$ D . The differentiable dT has rank 2. Then T -> D i.e T maps D onto a surface in u,v,w space and the function f,g,h are functional dependent in D (6)

7. Using Gauss divergence theorem, evaluate the integral $\iint_S F.ndA$ of $F=[x^3,y^3,z^3]$ and S is the sphere $x^2+y^2+z^2=9$ (6)

8. By using Greens theorem evaluate $\int_C F(r).dr$ where $F=\frac{e^y}{x}\hat{i}+e^y\ln x+2x\,\hat{j}$, where $R: 1+x^4\le y\le 2$ (6)

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