Total No. of Questions : 4]

SEAT No. :

PD-421

[Total No. of Pages : 2

[6409]-279

S.E. (Insem.)

COMPUTER SCIENCE AND ENGINEERING (Data Science)

Mathematical Foundation for Data Science - II

(2019 Pattern) (Semester - IV) (210652)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates :

1) *Answer Q.1 or Q.2 and Q.3 or Q.4.*
2) *Assume suitable data if necessary.*
3) *Draw neat diagrams wherever necessary.*
4) *Figures to the right side indicate full marks.*

Q1) a) Justify with an example Directional derivative of function is scalar quantity. [5]

b) Evaluate $\iint (\nabla \times \bar{F}).d\bar{s}$ where $\bar{F} = (x^3 - y^3)\bar{i} + xyz\bar{j} + y^3\bar{k}$ and S is surface $x^2 + 4y^2 + z^2 - 2x = 4$ above plane $x = 0$. [5]

c) Explain any five applications of multivariable calculus used in data science? [5]

OR

Q2) a) Using Green's theorem show that $\oint \bar{F}.\overline{dr}$ for $F = (x, 2y)$ over first quadrant of circle $x^2 + y^2 = 1$. [5]

b) State and explain Gauss's divergence theorem. [5]

c) Define divergence and curl. Compute the divergence of $F = x^2 i + y^2 j + z^2 k$. [5]

Q3) a) Define a set and explain different types of sets with examples. [5]

b) Explain P-series Test with Example for convergent series & divergent Series. [5]

c) Define a sequence. What is the difference between finite and infinite sequences? [5]

OR

P.T.O.

Q4) a) State and explain the Comparison test & Ratio Test for series convergence. [5]

b) Perform the following set operations on [5]

$A = \{1, 2, 3, 4\}$ $B = \{3, 4, 5, 6\}$

i) $A \cup B$ ii) $A \cap B$

iii) $A - B$ iv) $B - A$

v) $A \subseteq A$

c) Determine whether the sequence $a_n = \frac{1}{n}$ is convergent or divergent. [5]

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