Exam.Code:5151
Sub. Code: 14352

2124

B.Sc. Data Analytics (FYUP)
First Semester
Paper: Basics of Mathematics

Time allowed: 3 Hours **Max. Marks: 90**

NOTE: ***Attempt five questions in all, including Question No. 9 (Unit-V) which is compulsory and selecting one question each from Unit I - IV.***

x-x-x

UNIT I

1.) Write short notes using examples for: venn diagram, bijective functions, propositional and predicates, and partitions of sets.

(4+4+6+4=18)

2.) (i) Show that $\neg(p \vee q)$ and $\neg p \wedge \neg q$ are logically equivalent.
(ii) Discuss role of quantifiers with examples.
(iii) Define set difference and set symmetric difference with examples.

(6×3=18)

UNIT II

3.) Explain multi graphs, Eulerian path, planar graph, weighted graph, path, and circuit using diagrams.

(6×3=18)

4.) (i) Define Hermitian and skew Hermitian matrices.
(ii) Write short notes using examples for: inverse of matrix, rank of matrix, eigen values and characteristic equation of a matrix.

(6+(3+3+3+3)=18)

UNIT III

5.) Discuss using examples for: Lattices, Boolean lattices and Boolean algebra.

(6×3=18)

6.) Explain in detail for: propositional calculus, digital networks and switching circuits.

(6×3=18)

UNIT IV

7.) (i) Prove the identity, $(\vec{a} \times \vec{b}).(\vec{c} \times \vec{d}) = (\vec{a}.\vec{c})(\vec{b}.\vec{d}) - (\vec{a}.\vec{d})(\vec{b}.\vec{c})$
(ii) Let $\vec{a}$ and $\vec{b}$ be two unit vectors and α be the angle between them, then find the value of α such that $\vec{a} + \vec{b}$ is a unit vector.

(9+9=18)

8.) (i) Prove that $\vec{a}.\vec{b} = \vec{b}.\vec{a}$
(ii) What is vector product of three vectors written as $\vec{a} \times (\vec{b} \times \vec{c})$
(iii) Write short note on intersection of lines and planes.

(6×3=18)

UNIT V(Compulsory Question)

9.) (i) What are binding variables and duality principle?
(ii) Define shortest path and symmetric matrix.
(iii) Differentiate between Boolean lattice and Boolean algebra.
(iv) How scalar multiplication different from vector product?

(5+5+4+4=18)

x-x-x