ATAL BIHARI VAJPAYEE VISHWAVIDYALAYA BILASPUR (C.G.)

Pre Ph. D. Course work Examination 2019-20

MATHEMATICS

PAPER II: CW – 02 (TOOLS AND TECHNIQUES)

Model question paper

[Set – I]

Duration - 3.00 Hrs **Max. Marks - 80**

Note: Section - A is Compulsory. Answer one question from each unit of Section - 'B' carrying equal marks

---

Section - A

1. Answer the following questions in brief. **2 X 10 = 20**

(i) Write Latex structure for limits.

(ii) Write Latex structure for integration.

(iii) Define Contraction Mapping.

(iv) Give an example of continuous function which is not uniformly continuous.

(v) Define (C,1) Sum.

(vi) Define Abel Sum.

(vii) Give definition of modulus of continuity of a function.

(viii) Define $A \subseteq B$ where A, B $\in \mathcal{F}(x)$.

(ix) Define the degree of subset hood S (A,B).

(x) Write difference between summation and convergence of a series.

Section - B **12 X 5 = 60**

UNIT – I

2. What is the list environment in Latex?

3. What is document classes and document sectioning in Latex?

UNIT – II

4. (a) A fuzzy set A on R is convex, if $A(\lambda x_1 + (1-\lambda)x_2) \geq \min(A(x_1), A(x_2))$
$\forall\ x_1, x_2 \in R$ **and all** $\lambda \in [0,1]$

Where min denotes minimum operator.

(b) If A, B $\in \mathcal{F}(x)$ **prove that** $A \cup (A \cap B) = A$

5- Let $A_i \in \mathcal{F}(x)$ **for all** $i \in I$**, where I is an index set. Then prove that**

$\cup_{i \in I}\, a^{\alpha} A_i \subseteq \cup_{i \in I}\, a^{\alpha}(A_i)$ **but not conversely.**

UNIT – III

6. State and prove Banach fixed point theorem.

7. State and prove Kannan's fixed point theorem.

UNIT – IV

8. Show that two regular Norland methods (N, p_n) **and** (N, q_n)**are equivalent,**

If - $|k_n| < \infty,\ |l_n| < \infty$.

9. State and prove necessity and sufficient condition for the regularity of the (N, p_n) **method.**

UNIT – V

10. State and prove Jorden's Test.

11. State Riemann – Lebesgue theorem and write some important consequences of this theorem.

===***===