DIRECTORATE OF DISTANCE EDUCATION

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M.Sc. (Math) Assignment, June, 2023 Final Year

COURSE CODE: MAT109

1. State and prove Bounded Convergence Theorem.
2. Let X be a set and let μ be an outer measure on X. Then prove that:

   $M\mu^* = \{A \in P(X), A\ Y \in P(X), \mu^*(Y) = \mu(Y \cap A) + \mu^*(Y \cap A^c)$

3. State and prove Fubini Theorem.

COURSE CODE: MAT110

1. Prove that the function $\{z\}^2$ is continuous everywhere but nowhere differentiable except at origin.
2. State and prove Cauchy's integral theorem.
3. State and prove Jordan's Lemma.

COURSE CODE: MAT111

1. Find general and singular solutions of the equation $xp^2 - 2yp + 4x = 0$.
2. Solve :

   $$\frac{d^3y}{dx^3} - \frac{d^2y}{dx^2} - 6\frac{dy}{dx} = 1+x^2$$

3. Solve $(y - z)(y+z - 2x)dx + (z - x)(z+x - 2y)dy + (x - y)(x+y - 2z)dz = 0$

COURSE CODE: MAT112

1. Discuss the Background of Set Theory.
2. Prove that union of a non-empty set of Dedekind cuts is either itself a Dedekind cut or is the set Q.
3. Let f: T S be a one-toone function mapping T on to S. If T is a well ordered set; then T induces a well ordering on S. Hence, every countable set can be well-ordered.

COURSE CODE: MAT113

1. Briefly explain the feature of harddisk with a neat diagram.
2. What is an operator? Describe various types of operators available in C language.
3. What are the different categories of functions in C? Give examples.

COURSE CODE: MAT114

1. How do you use # define to set values of constants in your program?
2. How do you invoke a base member function from a derived class in which you have overridden that function?
3. Is it legal in C^{++} to overload the operator ++ so that it decrements a value in your class?

COURSE CODE: MAT115

1. If $(A,\leq)$ and $(B,\leq)$ are posets, then prove that $(A \times B, \leq)$ is a poset, with partial order $\leq$ defined by $(a,b) \leq (a', b')$ if $a \leq a'$ in A and $b \leq b'$ in B.
2. Define Boolean function and prove that the number of fundamental functional form for a Boolen function of n-Variable is $(2)^{2n}$.
3. From 7 boys and 4 girls a committee of 6 is to be formed; in how may ways can it be done when the committee contains (i) Exactly 2 girls and (ii) At least 2 girls?

Note: Last date of Assignment submission (By Post only) - 20.05.2023
Send only by Post. (Postal Address:- Director, Directorate of Distance Education, L.N. Mithila University, Denvi Road, Darbhanga- 846004)