SRI PADMAVATI MAHILA VISVAVIDYALAYAM::TIRUPATI

Master of Science (Mathematics) Fourth Semester

ASSIGNMENT

M.Sc.MD 4.01 – DISCRETE MATHEMATICS

All questions carry equal marks

4 x 5 = 20 Marks

1. Prove the statement is true by Mathematical Induction

$1^2+3^2+5^2+\text{----------}+(2n-1)^2=\frac{n(2n+1)(2n-1)}{3}$

2. Let R be the relation from A to B. A_1,A_2 are subsets of A. then prove that

(a) If $A_1 \subseteq A_2$ then $R(A_1) \subseteq R(A_2)$

(b) $R(A_1 \cap A_2) \subseteq R(A_1) \cap R(A_2)$

3 .Consider the Boolean polynomial $P(x_1, x_2, x_3) = (x_1 \wedge x_{2)} \vee(x_1 \vee (x_2{}^1 \wedge x_3))$ construct the truth table for the Boolean function $f:B_3 \to B$ determined by Boolean polynomial.

4. Determine the coset leader $N = e_H(B^m)$ for the parity check matrix $H=\begin{bmatrix} 1 & 1 \\ 1 & 0 \\ 1 & 0 \\ 0 & 1 \end{bmatrix}$.

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M.Sc.MD 4.02 – MEASURE & INTEGRATION

All questions carry equal marks

4 x 5 = 20 Marks

(1) Let $\{A_n\}$ be Countable Collection of sets of real no:s. Then $m^*(\bigcup_n A_n) \leq \sum_n m^* A_n$

(2) Let c be a Constant and f, g two measurable functions defined on the Same domain. Then the functions f+c, f+g, cf, g-f and fg are also measurable.

(3) Let f be a non-negative function and $\{E_i\}$ be a sequence of disjoint measurable sets. Let $E = \bigcup_i E_i$, then $\int_E f = \sum_n \int_{E_n} f$

(4) If f is a bounded variation on [a, b]. Then $T_a^b = P_a^b + N_a^b$ and $f(b) - f(a) = P_a^b - N_a^b$

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ASSIGNMENT

M.Sc.MD 4.03 – NUMERICAL ANALYSIS

All questions carry equal marks

4 x 5 = 20 Marks

1. Find all the eigenvalues & the corresponding eigenvectors of the matrix $A = \begin{bmatrix} 1 & \sqrt{2} & 2 \\ \sqrt{2} & 3 & \sqrt{2} \\ 2 & \sqrt{2} & 1 \end{bmatrix}$ by Jacobi's method.

2. Tabulate the solution of $\frac{dy}{dt} = t + y$, $y(0) = 1$ in the interval $0 \le x \le 0.4$, with $h = 0.1$, using Milne's Predictor - Corrector method.

3. Solve the following initial boundary value problem using an explicit finite difference method: $\frac{\partial T}{\partial t} = \frac{\partial^2 T}{\partial x^2}$, $0 \le x \le 1$

   Given $T = \sin \pi x$ when $t = 0$, $0 \le x \le 1$

   $T = 0$ at $x = 0$ & $x = 1$ for $t > 0$.

   & hence examine the accuracy of the numerical solution at $t = 0.006$ with its analytical solution.

4. Solve the Poisson's equation $u_{xx} + u_{yy} = -10(x^2 + y^2 + 5)$ in the domain $0 \le x, y \le 1$; subject to the conditions $u = 0$ at $x = 0, x = 1$; $u = 0$ at $y = 0$; $u = 1$ at $y = 1$ for $0 < x < 1$, using central difference approximation to both the space derivatives with uniform mesh spacing $h = \frac{1}{3}$. Use Liebmann iterative method to find the solution of the resulting system.

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ASSIGNMENT

M.Sc.MD 4.04 – POSITIVELY ORDERED SEMI-GROUPS

All questions carry equal marks

4 x 5 = 20 Marks

1(a) Prove that x is a maximal element of S if and only if x is a zero of S for positively totally ordered semigroups

(b) let S be an o-Archimedean totally ordered semigroup then prove that it contains a maximal element.

2(a) let S be a positively or negatively totally ordered semigroup, if S is a ζ (zeta) indecomposable then prove that S is o-Archimedean

(b) let S be a positively totally ordered semigroup then prove that S is a semilattice ($S = \cup S_\alpha$) of o-Archimedean positively totally ordered semigroup, where S_α contains no identity, if $|S_\alpha| > 1$

3(a) If S is an o-Archimedean p.t.o semigroup without identity and S is finitely generated as a right (left) ideals then prove that S is finitely generated.

4(~~ii~~) If S contains a minimal element iff ~~S=~~ $S = x \cup xS$ if S is finitely generated as a right ideal (or) if S is ~~finitely~~ generated then prove that S contains a minimal element.

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Master of Science (Mathematics) Fourth Semester

ASSIGNMENT

M.Sc.MD 4.05 – APPLIED GRAPH THEORY

All questions carry equal marks

4 x 5 = 20 Marks

1) (a) Show that if $e \in E$ then $\omega(G) \leq \omega(G-e) \leq \omega(G)+1$
(b) Prove that a graph is bipartite if and only if it contains no odd cycles.

2 (a) Show that if G is tree then $\varepsilon = \nu - 1$.
(b) prove that G be a graph with $\nu-1$ edges. Then the following three statements are equivalent (1) G is Connected
(2) G is acyclic
(3) G is a tree

3) (a) prove that a nonempty connected graph is Eulerian if and only if it has no vortices of odd degree
(b) prove that if G is Eulerian then any trail in G acted by Fleury's algorithm is an Euler tour of G.

4 (a) prove that a maching M in G is maximum maching if and only if G contains no augmenting path.

(b) State and prove Marriage theorem.