MANONMANIAM SUNDARANAR UNIVERSITY

DIRECTORATE OF DISTANCE AND CONTINUING EDUCATION

INTERNAL ASSIGNMENT FOR MAY 2025 EXAMINAITONS

M. Sc Mathematics – First Semester

Algebraic Structures

Sub-Code: SMAM11

1.) **(A)** Derive the class equation for finite group.

(OR)

(B) Let G be a group of order 715. Then the sylow 13-snbgup H of G 15 in Z (G)

2.) **(A)** Let V be an n-dimensional vector space over a field F. Then, given any element $T \in A(V)$, there exists a non trivial polynomial $q(x) \in F[x]$ of degree at most n^2, such that $q(T) = 0$.

(OR)

(B) Prove that there exists a subspace W of V, invariant under T, such that $V = V_1 \oplus W$.

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M. Sc Mathematics – First Semester

Real Analysis - I

Sub-Code: SMAM12

1.) **(A)** Let f be bounded variation on [a,b] and assume that $c \in (a,b)$. Then f is of bounded variation on [a,c] and on [c,b] and we have $V_f(a,b) = V_f(a,c) + V_f(c,b)$.

(OR)

(B) State and prove Euler's Summation Formula.

2.) **(A)** State and prove Mertens Formula.

(OR)

(B) Assume that $f_n \to f$ uniformly on S. If each f_n is continuous at a point 'c' of S, then the limit function f is also continuous at c.

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M. Sc Mathematics – First Semester

Ordinary Differential Equations

Sub-Code: SMAM13

1.) **(A)** Find the solution Φ of the initial value problem $y''' + y = 0$, y(0) = 0, $y'(0) = 1, y''(0) = 0$.

(OR)

(B) Verify that the function $\Phi_1(x) = x$ satisfies the equation . $x^2y''' - 3x^2y'' + 6xy' - 6y = 0$, for $x > 0$. Find the second solution Φ_2. Also show that $\{\Phi_1, \Phi_2\}$ form a basis for the solution for $x>0$.

2.) **(A)** Find two linearly independent power series solutions (in powers of x) of the equation $y'' - xy' + y = 0$.

(OR)

(B) **(i)** Solve (6x-4y+1)dy = (3x-2y+1)dx.

(ii) Solve cosxcosydx-2sinxsinydy=0.

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M. Sc Mathematics – First Semester

Graph Theory and Applications

Sub-Code: SMAE11

1.) **(A)** An edge e is a cut edge of a connected graph G if and only if there exists vertices u and v such that e belongs to every (u,v) path.

(OR)

(B) If G is a graph with v-1 vertices, prove that the following are equivalent.

(a) G is connected.

(b) G is acyclic.

(c) G is a tree.

2.) **(A)** State and Prove Cayley's recursive formula.

(OR)

(B) State and Prove Tutte's perfect Matching Theorem.

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INTERNAL ASSIGNMENT FOR MAY 2025 EXAMINAITONS

M. Sc Mathematics – First Semester

Fuzzy Sets and their Applications

Sub-Code: SMAE12

1.) **(A)** State and Prove Decomposition theorem.

(OR)

(B) If $\underset{\sim}{R}$ is transitive and refelexive (that is , is a preoder), then $\mathbb{R}^k{}_{\sim} = \mathbb{R}_{\sim}$, k=1,2,3,…

2.) **(A)** State and Prove theorem of decomposition for a similitude relation.

(OR)

(B) State and Prove decomposition theorem for a fuzzy perfect order relation.