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| **SESSION** | **March 2023** |
| **PROGRAM** | **BCA** |
| **SEMESTER** | **I** |
| **course CODE & NAME** | **DCA1103, Basic Mathematics** |
| **CREDITS** | **4** |

**Set-I**

**1. State inclusion-exclusion principle. In a group of 50 people, 35 speak Hindi, 25 speak both English and Hindi and all the people speak at least one of the two languages. How many people speak only English and not Hindi? How many people speak English?**

**Ans:** The inclusion-exclusion principle is a counting principle used in combinatorial mathematics to calculate the size of a union of multiple sets by taking into account their overlaps.

**In the given scenario:**

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**2. Simplify into form and find its modulus and the amplitude.**

**Solution: Given expression:** z = (cos θ + i sin θ)^5 / (cos θ - i sin θ)^4

We can simplify this expression by using the properties of complex numbers, specifically the fact that (a + bi)^n = a^n

**3. A. Solve:.**

**Solution:** To solve the integral ∫\_0^ (π/2) √ (1+sin^2(x)) dx, we can make a substitution to simplify the integrand.

**Let's use the substitution u = sin(x), so that du = cos(x) dx.**

Substituting u = sin(x) and du = cos(x) dx, we get:

∫\_0^(π/2)√(1+sin^2(x))dx = ∫\_0^(π/2)√(1+u^2)du

**B. Solve the differential equation.**

**Solution: - To solve the given differential equation:**

(2x - y + 1) dx + (2y - x - 1) dy = 0

We can use the method of exact differential equations. A differential equation of the form M(x, y)dx + N(x, y)dy = 0 is exact if and only if ∂M/∂y = ∂N/∂x, where ∂M/∂y denotes the partial derivative of

**Set-II**

**4. By using truth tables, check whether the propositions and are logically equivalent or not?**

**Solution:** To check whether the propositions ~ (p∧q) and (∼p) ∨ (∼q) are logically equivalent or not, we can use truth tables.

A truth table is a table that shows all possible combinations of truth values for the propositional

**b. Consider the set under multiplication modulo 18 as a group. Construct themultiplication table for *G* and find the inverse of each element of *G.***

**Solution: The multiplication table for the set G= {1, 5, 7, 11, 13, and 17} under multiplication modulo 18 is as follows:**

\* | 1 5 7 11 13 17

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1 | 1 5 7 11 13 17

5 | 5 10 14 2 7 11

**4. ALet us consider a circle of radius 2 cm. If an arc of this circle subtends an angle of 20 radian to the center, then what is the length of the arc and area of the sector such formed?**

**Solution: The length of an arc of a circle can be calculated using the formula:**

Arc Length = r \* θ

**b. Evaluate the followings:**

**(i) (ii)**

**Solution:**

1. To evaluate the limit as n approaches infinity for the expression (2+n+n^

**6. AFind the derivative of .**

**Solution:** To find the derivative of y = (x + sin(x))/(e^x - cos(x)), we can use the quotient rule of differentiation.

**The quotient rule states that for a function u(x)/v(x), where u(x) and v(x) are functions of x, the derivative is given by:**

(dy/dx) = (v(x) \* du/dx - u(x) \* dv/dx) / (v(x)) ^2

**Applying the quotient rule to the given function:**

u(x) = x + sin(x) v(x)

**b. Find where and .**

**Solution:**