Register No.: …… Name: ……..

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIRST SEMESTER INTEGRATED M.C.A DEGREE EXAMINATION (R), FEBRUARY 2022

(2020 SCHEME)

Course Code: **20IMCAT103**

Course Name: **Basic Mathematics**

Max. Marks: **60** **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. Define Cartesian product of two sets with an example?
2. List the elements of the set S = {x:x^2 = 1, $x \in Z$} and find $n(S)$.
3. Define Relation? How many relations are there on a set with n elements?
4. Differentiate Domain, Codomain and Range of a function with an example?
5. When will be a function is said to be one-one and onto?
6. Define an Invertible function with an example.
7. Find the derivative of y = $x^5 + x^3$.
8. Give a geometrical meaning of Differentiability.
9. State the fundamental theorem of Calculus.
10. Evaluate $\int_1^3 (x^2 + x)\, dx$

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I

11. a) State and prove Associative property of set operations. (3)
    b) Let A, B and C be sets. Show that $\overline{A \cup (B \cap C)} = (\bar{C} \cup \bar{B}) \cap \bar{A}$. (3)

OR

12. a) If X and Y are two sets such that $n(X)$ = 17, n(Y) = 23 and $n(X \cup Y)$ = 38,Find $n(X \cap Y)$? (3)
    b) In a school, there are 20 teachers who teach mathematics or physics. Of these, 12 teach mathematics and 4 teach both physics and mathematics. How many teach physics? (3)

MODULE II

13. a) Define an Equivalence Relations? (2)
    b) Let R be a relation on the set of real numbers such that aRb if and only if a-b is an integer. Check whether R is an equivalence relation (4)

OR

14. a) Define a Partial ordering on a set (2)

b) Let $R = \{(a,b),(a,d),(b,b),(b,d),(c,a),(c,b),(d,b)\}$ be a relation on {a,b,c,d}. Draw the directed graph associated with R and using this check whether the relation is reflexive, symmetric and antisymmetric? (4)

MODULE III

15. Let the function f(x) = 5x+1 from R to R. Is f an invertible and if it is invertible, then find its inverse? (6)

OR

16. a) Define composition of a function with geometrical interpretation (3)

b) Let $f(x) = x^2 + 2$, $g(x) = 2x + 3$, $h(x) = x + 3$, find $f_o g$, $g_o h$ and $h_o f$? (3)

MODULE IV

17. a) Find $f'(\frac{\pi}{2})$ if $f(x) = \sqrt{1 + cosx}$ (3)

b) Find the derivative of $y = (x^2 + 1)(x^3 + 3)$ (3)

OR

18. a) Find y'' if $y = secx$. (2)

b) Find $y'(1)$ & $y'(2)$, if $y(x) = \left(x + \frac{1}{x}\right)^2$. (4)

MODULE V

19. a) Evaluate $\int(3t^2 + \frac{t}{2})dt$. (2)

b) Find the area of the region enclosed by the parabola $y = 2 - x^2$ and the line $x + y = 0$. (4)

OR

20. a) Find the area of the region between the x-axis and the graph of $f(x) = x^3 - x^2 - 2x$, $-1 \le x \le 2$. (3)

b) Evaluate $\int_1^4 \left(\frac{3}{2}\sqrt{x} - \frac{4}{x^2}\right) dx$. (3)

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