TH241325MINC

Reg. No.....

Name.....

FYUG PROGRAMME EXAMINATIONS, NOVEMBER 2024

(2024 Admission Regular)

SEMESTER I – MINOR C COURSE (MATHEMATICS)

MT1DSCB101B24-GROUND ROOTS OF MATHEMATICS

Time: 1.5 Hours **Maximum Marks: 50**

PART A

I. Answer all questions (MCQ). Each question carries 1 mark

Q.No:	QUESTIONS	CO	LEVEL
1.	Identify the false statement. (a) $\emptyset \in \{\emptyset\}$ (b) $\emptyset \in \{\emptyset,\{\emptyset\}\}$ (c) $\{\emptyset\} \in \{\{\emptyset\}\}$ (d) $\{\emptyset\} \subset \{\emptyset, \{\emptyset\}\}$	1	R
2.	Select an odd function (a) $f(x) = 3$ (b) $g(x) = x^4 + 3x^2 - 1$ (c) $f(x) = x^2 + 1$ (d) $f(x) = x^{-5}$	1	R
3.	Determine $\frac{d}{dx}(2x^6 + x^{-9})$. (a) $12x^5 - 9x^{-10}$ (b) $8x^5 - 9x^{-10}$ (c) $12x^5 - 9x^{-8}$ (d) $12x^5 + 9x^{-10}$	3	Ap
4.	Compute $f'(x)$, if $f(x) = cos^2 x$ (a) $-2sin\,x\,cos\,x$ (b) $2sin\,x\,cos\,x$ (c) $sin\,x\,cos\,x$ (d) $-sin^2 x$	3	Ap
5.	Identify the true statement regarding a function $f(x)$ with critical point at $x = c$. (a) $f(c)$=0 (b) $f'(c) = 0$ or $f'(c)$ is undefined (c) $f(c)$ must be a maximum or minimum (d) $f''(c) = 0$	4	U

(5x1=5)

II. Answer all questions in one word. Each question carries 1 mark

Q.No:	QUESTIONS	CO	LEVEL
6.	State the number of elements in A X B when set A has m elements and set B has n elements.	1	R
7.	Write the derivative of a constant function.	3	Ap
8.	Calculate $(f \circ g)'(2)$, if $f'(9) = 5$, $g(2) = 9$ and $g'(2) = -3$	3	Ap
9.	Compute $f'(x)$, if $f(x) = x$	3	Ap

10.	Identify the critical points of $f(x) = 1 - x^5$.	4	U

(5x1=5)

PART B

III. Answer any six questions in one paragraph. Each question carries 5 marks.

Q.No:	QUESTIONS	CO	LEVEL
11.	1) Let A = {a, b, c, d}, B = {y, z}. Determine A X B. 2) Let A = {0, 2,4,6,8,10}, B = {0,1,2,3,4,5,6} and C = {4,5,6,7,8,9,10}. Determine (A U B) ∩ C.	2	Ap
12.	Determine the inverse of the function y = (1/2) x + 1 and express it in terms of x.	2	Ap
13.	Calculate the points at which the graph of $y = x^3 - 3x + 4$ has a horizontal tangent line.	3	Ap
14.	Establish that $y = x^3 + 3x + 1$ satisfies $y''' + x\,y'' - 2\,y' = 0$	3	Ap
15.	Compute $f'(x)$, if $f(x) = \frac{5-\cos x}{5+\sin x}$	3	Ap
16.	Compute $\frac{d^2y}{dx^2}$, if $y + \sin y = x$ using implicit differentiation.	31	Ap
17.	Identify the intervals on which the function $f(x) = x^2 - 4x + 3$ is increasing and the intervals on which it is decreasing.	4	U
18.	Determine the absolute maximum and minimum values of the function $f(x) = 8x - x^2$ on the interval [0, 6].	5	Ap

(6x5=30)

PART C

IV. Answer any one question. The question carries 10 marks.

Q.No:	QUESTIONS	CO	LEVEL
19.	1) Using Venn diagram illustrate A ∩ B where A = {1,3,5} and B = {1,2,3} 2) Sketch the graph of the greatest integer function. 3) Determine the derivative, given f(x) = $\frac{3x+4}{x^2+1}$.	2, 3	Ap
20.	1) Determine the intervals on which $f(x) = x^3 - 3x^2 + 1$ is increasing, decreasing, concave up and concave down. 2) Compute $f'(x)$ if $f(x) = \frac{\sin x}{x^2+\sin x}$.	4, 3	Ap

(1x10=10)

CO : Course Outcomes Level : R – Remember, U – Understand, Ap- Apply, An- Analyze, E- Evaluate, C- Create