

2303000501033001
EXAMINATION FEBRUARY-MARCH 2024
BACHELOR OF SCIENCE (FIRST SEMESTER) (NEP)
MINOR MATHEMATICS PAPER - I (DIFFERENTIAL
CALCULUS AND COMPLEX VARIABLES)
THEORY-LEVEL 3

[Time: As Per Schedule]

[Max. Marks:25]

Instructions:

1. Fill up strictly the following details on your answer book
 - a. Name of the Examination : **BACHELOR OF SCIENCE (FIRST SEMESTER) (NEP)**
 - b. Name of the Subject : **MINOR MATHEMATICS PAPER - I (DIFFERENTIAL CALCULUS AND COMPLEX VARIABLES) THEORY-LEVEL 3**
 - c. Subject Code No : **2303000501033001**
2. Sketch neat and labelled diagram wherever necessary.
3. Figures to the right indicate full marks of the question.
4. All questions are compulsory.
5. As per the instruction number 1 of page 1.
6. Follow usual notations and conventions.

Seat No:

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Student's Signature

Q.1 માંગ્યા મુજબ લખો. (ગમે તે પાંચ)

5

Answer any FIVE from the following questions.

- (1) જો $y = e^{7x}$ તો y_n શોધો.
If $y = e^{7x}$ then find y_n
- (2) જો $y = x^2$ તો y_2 શોધો.
If $y = x^2$ then find y_2
- (3) જો $y = 2^x$ તો y_n શોધો.
If $y = 2^x$ then find y_n
- (4) $(\cos\theta - \sin\theta)^{-n}$ તો શોધો
Find $(\cos\theta - \sin\theta)^{-n}$
- (5) $\sin 15\theta$ ના વિસ્તરણનું છેલ્લું પદ શોધો.
Find the last term of expansion of $\sin 15\theta$

(6) સાબિત કરો: $\cosh\theta - \sinh\theta = \frac{1}{\cosh\theta + \sinh\theta}$

Prove that $\cosh\theta - \sinh\theta = \frac{1}{\cosh\theta + \sinh\theta}$

Q.2 કોઈ પણ બે ગણો.
Attempt any TWO.

10

(1) જો $y = \sin(ax + b); a, b, x \in R$ તો સાબિત કરો કે
$$y_n = a^n \cdot \sin\left(ax + b + \frac{n\pi}{2}\right)$$

If $y = \sin(ax + b); a, b, x \in R$ then prove that
$$y_n = a^n \cdot \sin\left(ax + b + \frac{n\pi}{2}\right)$$

(2) $e^x \sin^2 x$ નું x -પ્રત્યે n મું વિકલિત શોધો
Find the n^{th} derivative of $e^x \sin^2 x$

(3) જો $y = \cos^{-1}x, |x| \leq 1$ તો સાબિત કરો કે
$$(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} - n^2y_n = 0$$

If $y = \cos^{-1}x, |x| \leq 1$ then prove that
$$(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} - n^2y_n = 0$$

Q.3 કોઈ પણ બે ગણો.
Attempt any TWO.

10

(1) જો $x = \cos\theta + i \sin\theta$ તો $x^8 + \frac{1}{x^8}$ ની કિંમત શોધો .

If $x = \cos\theta + i \sin\theta$ then find the value of $x^8 + \frac{1}{x^8}$

(2) સાબિત કરો કે
$$\cos 8\theta = \cos^8\theta - 28\cos^6\theta\sin^2\theta + 70\cos^4\theta\sin^4\theta - 28\cos^2\theta\sin^6\theta + \sin^8\theta$$

Prove that :
$$\cos 8\theta = \cos^8\theta - 28\cos^6\theta\sin^2\theta + 70\cos^4\theta\sin^4\theta - 28\cos^2\theta\sin^6\theta + \sin^8\theta$$

(3) યુલર ના પ્રમેય નો ઉપયોગ કરી સાબિત કરો કે
 $\sinh(x + y) = \sinh x \cosh y + \cosh x \sinh y$

Prove that $\sinh(x + y) = \sinh x \cosh y + \cosh x \sinh y$ by the use of Euler's theorem.
