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Class Roll No.....

[Total No. of printed pages: 1]  
Enrollment No.....

LNCT UNIVERSITY, BHOPAL

B.Tech I Semester(Mid Sem.First)-DEC.,2024

Advance Calculus ,BT-102(CSE\AIML)

(Max. Marks: 20)

Time:1h30m

Note: Attempt all questions. Internal choices are given.

**Q1.** Expand  $\tan x$  by Maclaurin's Theorem as far as term  $x^5$  Find  $\tan 46.30'$  up to three places of decimal. (CO 1)

OR

Expand  $\log_e x$  in powers of  $(x - 1)$  and hence evaluate  $\log_e 1.1$  correct to four decimal places.  
(CO1)

**Q2.** Verify Rolle's Theorem for the function  $f(x) = \frac{\sin x}{e^x}$ , Interval  $(0, \pi)$ . (CO1)

OR

Find the maximum value of  $u$  where  $u = \sin x + \sin y + \sin(x+y)$ . (CO1)

**Q3.** Evaluate  $\lim_{n \rightarrow \infty} \left[ \left(1 + \frac{1}{n}\right) \left(1 + \frac{2}{n}\right) \dots \left(1 + \frac{n}{n}\right) \right]^{\frac{1}{n}}$  (CO2)

OR

Evaluate  $\int_0^\infty x^8 \frac{(1-x^6)}{(1+x)^{24}} dx$  (CO2)

**Q4.** Evaluate  $\int_0^3 (x^2 + 2) dx$  as a limit of sum. (CO2)

OR

Express  $\int_0^1 x^m (1-x^n)^p dx$  in terms of Gamma function and hence evaluate  $\int_0^1 x^5 (1-x^3)^{10} dx$ .  
(CO2)