Mid-West University
Examinations Management Office
Surkhet, Nepal
End Semester Examination-2080

Level: B.Ed. / I Semester   FM: 60
Time: 3.00 hrs.   PM: 30

Sub: Calculus for Teachers (MATH 414/315)

Candidates are required to give their answers in their own words as far as practicable.

Attempt All the Questions:

Group "B"   6×5 = 30

1. Define function and find the value of b which makes the function

$f(x) = x^2 - 1$ if $x < 3$

     $= 2bx$ if $x \geq 3$ continuous at $x = 3$

2. Find the ds/dx for the curve $x^{2/3} + y^{2/3} = a^{2/3}$

3. Find the equation of tangent and normal of the curve $x^2/4 + y^2/9 = 1$ at (2,3)

Or

Find the maximum and minimum values of the function.

$F(x, y) = x^2 + 3y^2 + 4x + 6y + 8$

4. Find the nth derivatives of the function of $Y = (ax + b)^m$

5. Evaluate the following limits $\lim_{x \to 0} \dfrac{tan x}{x - sin x}$

6. Find the asymptotes of the curve $y = \dfrac{x}{(x-1)^2 (x-2)}$

Or

Trace the following curve $y^2 = x^2(a - x)$

Group "C"   2×10 = 20

7. Find the pedal equation of the curve $\dfrac{y^2}{4a} = (x+1)$

8. State and prove the langrage's mean value theorem.

Or

Define homogeneous function of three variables. Verify Euler's Theorem of the function $f(x, y) = x3 - 2x2y + 3xy2 + y3$.

THE END

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Roll No: ....

Group 'A' $\quad\quad$ 10 × 1 =10

Tick (✓) the best answers:

1. Which one function is known as surjective?
   a. Onto
   b. One to one
   c. Composite
   d. Inverse

2. The polar sub-normal of the curve $r=f(\theta)$ at the point (r, θ) is given by ...
   a. $r^2 \dfrac{d\theta}{dr}$
   b. $\dfrac{dr}{d\theta}$
   c. $\dfrac{d\theta}{dr}$
   d. $r\dfrac{d\theta}{dr}$

3. The value of dy/dx of $y^2 =12x$ at $(3,6)$ is ...
   a. 1/6
   b. 2
   c. 3
   d. 1

4. The length of sub- normal is ...?
   a. y/y_1
   b. $y \cdot y_1$
   c. $y\sqrt{1+(y_1)^2}$
   d. all of the above

5. Which one of the followings is the indeterminate form...?
   a. 1/2
   b. 3/4
   c. ∞/∞
   d. $\dfrac{0}{\infty}$

6. How many rules of tracing of Cartesian curve are there?
   a. 4
   b. 6
   c. 5
   d. 8

7. The asymptote of the form $y = mx + c$ is known as...
   a. horizontal
   b. vertical
   c. oblique
   d. none of the above

8. The nth derivative of the function $y = x^n$ is ...
   a. nx^{n-1}
   b. ny^n
   c. $n!$
   d. ny^{n-1}

9. For what value of c the function $f(x) = \sin x$ in $[-\pi, \pi]$ satisfies the Rolle's Theorem?
   a. 0
   b. 1
   c. π
   d. 2

10. What is the degree of function $x^5 + x^3y^3 + 7x^4y5$?
    a. 5
    b. 6
    c. 7
    d. 9