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B.Tech 1st year
ASC Branch

University Roll No. :

First Term Examination, Odd Semester 2015-16

B.Tech. (I Year)- I Semester

Subject:- Mathematics - I | Subject Code:- AHM-1001

Time: 1 ½ Hours | Max. Marks: 20

Section-A

Note: ***Attempt All Questions*** 1×5=5

1. Find the nth derivative of $\frac{7}{x+2}$
2. If $u = \log\left(\frac{x^4+y^4}{x+y}\right)$ then find the value of $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ by Euler's theorem.
3. If $x^y + y^x = c$ then find $\frac{dy}{dx}$.
4. Define Asymptote and name the asymptotes if it is not parallel to co-ordinate axis.
5. State Taylor's theorem for two variables about origin.

Section –B

Note: ***Attempt Any three Questions*** 2×3=6

1. Find the asymptotes of $x^2 + 3xy + 2y^2 + 3x - 2y + 1 = 0$
2. If u $= f(2x - 3y, 3y - 4z, 4z - 2x)$, then prove that
$$\frac{1}{2}\frac{\partial u}{\partial x} + \frac{1}{3}\frac{\partial u}{\partial y} + \frac{1}{4}\frac{\partial u}{\partial z} = 0$$
3. Expand $e^{\sin x}$ by Maclaurin's series upto the terms containing x^4.
4. If $y = (x + \sqrt{1+x^2}\,)^m$, then prove that
$$(1+x^2)y_{n+2} + (2n+1)xy_{n+1} + (n^2 - m^2)y_n = 0$$

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Section – C

Note: ***Attempt Any three Questions*** 3×3=9

1. If $y = \sin(m\sin^{-1}x)$, Find (y_n) at $x = 0$.
2. If u $= e^{xyz}$ then prove that $\frac{\partial^3 u}{\partial x \partial y \partial z} = (1 + 3xyz + x^2y^2z^2)u$
3. Obtain Taylor's Expansion of $f(x,y) = tan^{-1}\left(\frac{y}{x}\right)$ about point (1,1) upto and inclusive of second degree terms. Hence compute $f(1.1, 0.9)$.
4. If u $= cosec^{-1}\left(\frac{x^{\frac{1}{2}}+y^{\frac{1}{2}}}{x^{\frac{1}{3}}+y^{\frac{1}{3}}}\right)^{1/2}$, then prove that
$$x^2\frac{\partial^2 u}{\partial x^2} + 2xy\frac{\partial^2 u}{\partial x \partial y} + y^2\frac{\partial^2 u}{\partial y^2} = \frac{\tan u}{144}(13 + tan^2 u)$$