5/12/14

Appoint

(REVISED COURSE)

QP Code:11932

(3 Hours)

Total Marks: 80

N. B.: (1) Q. No.1 is compulsory.

- (2) Attempt any three questions from question no.2 to question no.6.
- (3) Figures to the right indicate full marks.
- 1. (a) If $\tanh x = \frac{2}{3}$, find the value of x and then $\cosh 2x$

3

(b) If $u = \tan^{-1}\left(\frac{y}{x}\right)$, Find these value of $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2}$

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(c) if $x = r \cos \theta$, $y = r \sin \theta$ $\partial(x,y)$

3

Find $\frac{\partial(x,y)}{\partial(r,\theta)}$

(d) Prove that $\log \sec x = \frac{1}{2}x^2 + \frac{1}{1z}x^4 + \frac{1}{45}x^6 \dots$

3

(e) Show that every square matrix can be uniquely expressed as the sum of Hermitian martix and a skew Hermitian matrix.

4

(f) Find the n^{th} derivative of $y = \sin x \sin 2x \sin 3x$

2005

(a) Solve the equation x⁶+1=0
 (b) Reduce the matrix to normal form and find its rank, where so

6

 $A = \begin{bmatrix} 1 & -1 & 3 & 6 \\ 1 & 3 & -3 & -4 \end{bmatrix}$

 1
 3
 -3
 -4

 5
 3
 3
 11

(c) State and prove Eulers theorem for a homogeneous function in two variables: 8
Hence verify the Eulers theorem for

 $u = \frac{\sqrt{xy}}{\sqrt{x} + \sqrt{y}}$

3. (a) Test the consistency of the following equations and solve them if they are consistent.

6

2x - y + z = 8, 3x - y + z = 64x - y + 2z = 7, -x + y - z = 4

 $4x \cdot y + 2z = 7$, $-x + y \cdot z = 4$ (b) Find the stationary values

 $x^3 + 3xy^2 - 3x^2 - 3y^2 + 4$

6

(c) Separate into real and imaginary parts of sin⁻¹ (e^{iθ})

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QP Code:1'

4. (a) If
$$x = uv$$
, $y = \frac{u}{v}$ prove that $J.J = 1$

(b) Show that for real values of a and b,

$$e^{2 \operatorname{ai} \cot^{-1} b} \left[\frac{\operatorname{bi} - 1}{\operatorname{bi} + 1} \right]^{-a} = 1$$

8

(c) Solve the following equations by Gauss-seidel method

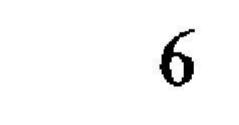
$$27x + 6y - z = 85$$

 $6y + 15y + 2z = 72$

$$6x + 15y + 2z = 72$$

$$x + y + 54z = 110$$

5. (a) Expond $\cos^7\theta$ in a series of cosines of multiple of θ



(b) If $\lim_{X \to 0} \frac{a \sinh x + b \sin x}{x^3} = \frac{5}{3}$, find a and b



(c) If $y = \frac{\sin^{-1} x}{\sqrt{1-x^2}}$ then prove that $(1-x^2) y_{n+1} - (2n+1) xy_n - n^2 y_{n-1} = 0$

6

6. (a) Examine whether the vectors

$$x_1 = [3, 1, 1]$$
 $x_2 = [2, 0, -1]$

 $x_3 = [4, 2, 1]$ are linearly independent.

(b) If u = f(x-y, y-z, z-x) then show that $\frac{\partial u}{\partial x} \div \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$ (c) Fit a straight line for the following data

Q

50 50 50 50	X		2	3	4	5	ó
	y	49	54	60	73	80	86