C.U.SHAH UNIVERSITY
WADHWAN CITY

University Examination-May 2015

Course Name: M.Sc-IV Subject Name : Problem solving-II(5SC04PBE1) Marks: 70
Duration : 3 Hours

Instructions:

1) Attempt all Question of both sections in same answer book/supplementary.
2) Use of Programmable calculator & any other electronic instrument prohibited.
3) Instructions written on main answer book are strictly to be obeyed.
4) Draw neat diagrams & figures (if necessary) at right places.
5) Assume suitable & perfect data if needed.

	SECTION - I	
Q-1 (A)	What is Lagrange's equation?	[01]
(B)	Obtain Newton-Raphson formula to find $\frac{1}{N}$ where N is positive integer.	[02]
(C)	Write the difference between algebraic equation and transcendental equation?	[02]
(D)	If f(x,y,z,p,q)=0 is given deferential equation then write the auxiliary equation for Charpit's method.	[02]
Q-2 (A)	Find a root of $x^3 - 2x - 5 = 0$ correct to four decimal places, using Bisection method.	[07]
(B)	Solve by Gauss – Seidal method. 20x + y – 2z = 17 3x + 20y – z = –18 2x – 3y + 20z = 25	[07]
	OR	
Q-2 (A)	Find a real root of the equation $\cos x = 3x - 1$ correct to four decimal places by using Newton-Raphson method.	[07]
(B)	Solve by Gauss-elimination method correct to three decimal places. x + 2y + z = 3 2x + 3y + 3z = 10 3x – y + 2z = 13	[07]
Q-3 (A)	Find a root of $xe^x - 2 = 0$ correct to two decimal places, using Regula-Falsi method.	[07]
(B)	Use Lagrange's Interpolation formula to find y when x=9.	[07]
	OR	

X	4	6	8	10
y	12	13	15	17

Q-3 (A) Evaluate $\frac{dy}{dx}$ at x = 35 from the following data. **[07]**

x	20	25	30	35	40	45
y	354	332	291	260	231	204

(B) The population of a certain town is given below. Using Numerical differentiation, find the rate of growth of the population in 1931. **[07]**

Year(x)	1932	1942	1952	1962	1972
Population(y) (in thousands)	41.62	61.80	80.95	104.56	133.65

SECTION - II

Q-4 (A)	What is clairaut's equation?	[01]
(B)	Solve: $\sqrt{p} + \sqrt{q}$ = x + y	[02]
(C)	Define group.	[02]
(D)	Show that identity element in group is unique.	[02]
Q-5 (A)	Solve $yz\frac{\partial z}{\partial x} + xz\frac{\partial z}{\partial y} = yz.$	[05]
(B)	Solve $\frac{\partial^2 z}{\partial y^2} = z$ if $y = 0, z = e^x$ and $\frac{\partial z}{\partial y} = e^{-x}$.	[05]
©	Solve $\frac{\partial^2 z}{\partial x \partial y} = \cosh x \sin y$.	[04]
	OR	
Q-5 (A)	Using method of separation of variables, solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$, where $u(x, 0) = 6e^{-3x}$.	[05]
(B)	Obtain three possible solutions of the wave equation $\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}$.	[05]
(C)	Solve $\frac{\partial^2 u}{\partial x^2} - 4\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 0.$	[04]
Q-6 (A)	Using charpit's method solve: 2xz-px^2-2qxy+pq=0	[07]
(B)	Solve : r - 4s + 4t = e^{2x+y}.	[07]
	OR	
Q-6 (A)	Let G be a finite group and let H be a subgroup of G Let a, b$\in$ G then Prove the fol lowing statements. (1) a $\in aH$. (2) If aH $\cap$ $bH \neq \emptyset$ then aH=bH.	[05]

(B)	Prove that if G is a finite group and a $\in G$ then $a^{\|G\|}$=e.	[05]
(C)	Compute the fol lowing products in S_4. (1) $\begin{pmatrix}1 & 2 & 3 & 4\\ 4 & 3 & 2 & 1\end{pmatrix}\begin{pmatrix}1 & 2 & 3 & 4\\ 1 & 2 & 3 & 4\end{pmatrix}$ (2) $\begin{pmatrix}1 & 2 & 3 & 4\\ 1 & 2 & 3 & 4\end{pmatrix}\begin{pmatrix}1 & 2 & 3 & 4\\ 4 & 3 & 2 & 1\end{pmatrix}$ (3) $\begin{pmatrix}1 & 2 & 3 & 4\\ 4 & 3 & 2 & 1\end{pmatrix}\begin{pmatrix}1 & 2 & 3 & 4\\ 4 & 3 & 2 & 1\end{pmatrix}$ (4) $\begin{pmatrix}1 & 2 & 3 & 4\\ 1 & 4 & 3 & 2\end{pmatrix}\begin{pmatrix}1 & 2 & 3 & 4\\ 4 & 1 & 3 & 2\end{pmatrix}$	[04]