Enrollment No: ______________________ Exam Seat No: ______________________

C.U.SHAH UNIVERSITY
Summer Examination-2017

Subject Name : Mathematics-I

Subject Code : 4SC01MAT1/4SC01MTC1 Branch : B.Sc(All)

Semester : 1 Date : 24/03/2017 Time : 10:30 To 1:30 Marks : 70

Instructions:
1. Use of Programmable calculator & any other electronic instrument is prohibited.
2. Instructions written on main answer book are strictly to be obeyed.
3. Draw neat diagrams and figures (if necessary) at right places.
4. Assume suitable data if needed.

Q-1 Attempt the following questions: (14)

a) Define : Square matrix. (1)

b) If f(x)=sinx then machlaurin's series of f(x) =…………………… (1)

c) True/false : Machlaurin's series is particular case of Taylor's series . (1)

d) Can you apply Roll's theorem for the function f(x) = $|x-1|$ in $[0,\ 2]$. Give the reason of your answer? (1)

e) What is singular matrix ? (1)

f) If A is 3 x 5 matrix and B is 5 x 5 matrix then What is order of A.B ? (1)

g) True/false :Every skew- symmetric metrix must have all diagonal entry zero. (1)

h) If A=$\begin{bmatrix} 3 & -2 \\ 6 & 4 \end{bmatrix}$, What is adjoint of A? (1)

i) Write an example of Symmetric matrix. (1)

j) What is degree of differential equation? (1)

k) Give an example of exact differential equation. (1)

l) True/false : Every square matrix is inverible. (1)

m) Write an example of partial differential equation with order one and degree one. (1)

n) Solve : y^2dy + x^2dx = 0. (1)

Attempt any four questions from Q-2 to Q-8

Q-2 Attempt all questions (14)

a) Define : Invertible matrix . **(2)**

b) Find inverse of $\begin{bmatrix} 5 & 4 \\ 5 & 5 \end{bmatrix}$. **(4)**

c) If A=$\begin{bmatrix} 1 & -1 & 2 \\ -2 & 2 & 3 \\ -1 & 1 & 4 \end{bmatrix}$ and B=$\begin{bmatrix} 2 & -3 & 4 \\ -7 & 5 & 5 \\ -3 & 4 & 5 \end{bmatrix}$, then find (i) A^2 (ii) B^2 . **(8)**

Is A^2 - B^2 =(A+B)(A-B) ?

Q-3		**Attempt all questions**	**(14)**
	a)	What is normal form of the matrix ?	**(2)**
	b)	If A = $\begin{bmatrix} 2 & 4 & -2 & 4 \\ -3 & -6 & 3 & -6 \\ 1 & 0 & 0 & 1 \end{bmatrix}$, then find rank of matrix A.	**(4)**
	c)	Discuss the consistency problem for the system $x - y + z = 1$ $2x-y+2z = 2$ $x+ y+3z = 3$.	**(8)**
Q-4		**Attempt all questions**	**(14)**
	a)	Define Eigen vector of the matrix .	**(2)**
	b)	Find the Eigen value of $\begin{bmatrix} 1 & 0 & 0 \\ 4 & -1 & 0 \\ 2 & 6 & 5 \end{bmatrix}$.	**(4)**
	c)	Write the statement of Caley –Hamilton theorem also verify it for the matrix $\begin{bmatrix} 2 & -1 & 2 \\ 5 & 2 & 2 \\ 1 & -2 & -2 \end{bmatrix}$.	**(8)**
Q-5		**Attempt all questions**	**(14)**
	a)	Define homogeneous differential equation.	**(2)**
	b)	Solve (5x+3y-6) dx + (3x+5y+4)dy=0.	**(4)**
	c)	What is linear differential equation in y ? solve: $cos^2x \frac{dy}{dx}$ + y = tanx	**(8)**
Q-6		**Attempt all questions**	**(14)**
	a)	Describe geometrical interpretation for Rolle's theorem also apply it for $f(x)=x^2-5x + 6$ in [2 ,3].	**(7)**
	b)	State Cauchy's mean value theorem and verify it for the functions $f(x)= (x-1)^2$, $g(x) = x\,(x-1)^3$, where $x \in [0, 2]$.	**(7)**
Q-7		**Attempt all questions**	**(14)**
	a)	Find order and degree of the following ODE. $\left(\frac{dy}{dx}\right)^5 + \frac{y}{\left(\frac{dy}{dx}\right)^2} + 1 = -1$.	**(2)**
	b)	Evaluate $\lim_{x\to 0} \frac{\log x^2}{\cot x^2}$	**(4)**

c) Solve : **(8)**

(1) $\frac{dy}{dx} - \frac{dx}{dy} = \frac{x}{y} - \frac{y}{x}$

(2) $y = 2px + y^2p^3$.

Q-8 **Attempt all questions** **(14)**

a) What is Cartesian coordinates for the points (2 ,-60^o)? **(2)**

b) Evaluate the following : **(6)**

(1) $\lim_{x \to 1} \left(\frac{1}{\log x} - \frac{1}{x-1} \right)$

(2) $\lim_{x \to 0} \frac{1-\cos x^2}{x^2 \sin x^2}$

c) State Lagrange's mean –value theorem f(x) = x(x-1)(x-2) on [0 , $\frac{1}{2}$]. **(6)**