Exam Seat No:_______________ Enrollment No:_________________

C.U.SHAH UNIVERSITY

Wadhwan City

Subject Code **4SC01MTC1** **Summer Examination-2014** **Date: 27/05/2014**

Subject Name: Mathematics-I

Branch/Semester:- B.Sc(Pure Science)/I **Time:10:30 To 1:30**

Examination: Remedial

SECTION-I

Q-1 a) Express the following points in the polar form $(\sqrt{3},\ 1), (\sqrt{3}, -1)$. (02)

b) Convert to Cartesian form $r = \frac{2}{(3\cos\theta + 4\sin\theta)}$. (02)

c) Find n[th] derivative of $\sin 2x$. (01)

d) State Taylor's Theorem. (01)

e) Evaluate $\lim_{x\to 0}\frac{\sin 2x}{x}$, using L'Hospital's rule. (01)

Q-2 a) State and prove Leibnitz's theorem. (05)

b) Evaluate $\lim_{x\to 0}\left(\frac{1}{\sin^2 x} - \frac{1}{x^2}\right)$. (05)

c) Using Maclaurian's formula, expand $\log(1 + e^x)$ in the power of x, up to the term containing x^4. (04)

OR

Q-2 a) Find n[th] derivative of $y = x^2 \log x$. (05)

b) Expand $\log x$ in powers of $(x - 2)$ up to first four terms. (05)

c) Evaluate $\lim_{x\to 0}\frac{(\tan x - x)}{x^3}$. (04)

Q-3 a) In usual notation prove that polar equation of circle is (05)

$$r^2 + r_1^2 - 2rr_1\cos(\theta - \theta_1) = a^2.$$

b) Verify the Rolle's theorem for the function $f(x) = x^3 - 4x,\ \ x \in [-2,\ 2]$. (05)

c) If $A = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$, then find the matrix $A^3 - 8A^2 + 7A$. (04)

OR

Q-3 a) Find the equation of the spheres which passes through the given circle $x^2 + y^2 + z^2 - 4x - y + 3z + 12 = 0; 2x + 3y - 7z = 10$ and touch the plane $x - 2y + 2z = 1$. (05)

b) Verify the Lagrange's mean value theorem for the function $f(x) = x(x - 1)(x - 2)$ on the interval $\left[0,\ \frac{1}{2}\right]$. (05)

c) If $A = \begin{bmatrix} 3 & 1 \\ 4 & 2 \end{bmatrix}$, then find the matrix $A^2 = 5A + k\,I_2$, find $k \in R$. (04)

SECTION-II

Q-4	a)	Define diagonal matrix.	(01)
	b)	Define hermitian matrix.	(01)
	c)	Define general solution of a differential Equation.	(01)
	d)	Find order and degree of $\left(\frac{dy}{dx}\right)^3 + 2\sin x\frac{dy}{dx} + xy = \frac{x^3}{\frac{dy}{dx}}$.	(01)
	e)	Is the matrix $A = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ in reduced row echelon form?	(01)
	f)	Solve $2x\,dx + 2y\,dy = 0$.	(01)
	g)	Is the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 3 \\ 1 & 0 & 8 \end{bmatrix}$ invertible ?	(01)
Q-5	a)	Solve the system $x + 2y - z = 5, 3x - y + 3z = 7, 4x - 2y + 4z = 12$.	(05)
	b)	Find inverse of the matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$.	(05)
	c)	Find the rank of $A = \begin{bmatrix} 1 & 4 & 5 & 2 \\ 2 & 1 & 3 & 0 \\ -1 & 3 & 2 & 2 \end{bmatrix}$.	(04)

OR

Q-5	a)	Find inverse by Gauss Jordan Method, for $A = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 1 & 0 \end{bmatrix}$.	(05)
	b)	Find normal form of the matrix $A = \begin{bmatrix} 1 & 2 & 3 & -1 \\ -1 & -1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \end{bmatrix}$ and hence rank of A.	(05)
	c)	Solve the homogeneous system	(04)

$$\begin{aligned} v + 3w - 2x &= 0 \\ 2u + v - 4w + 3x &= 0 \\ 2u + 3v + 2w - x &= 0 \\ -4u - 3v + 5w - 4x &= 0. \end{aligned}$$

Q-6	a)	Solve $x(y^2 - 1)dx = y(1 + x^2)dy$.	(05)
	b)	Solve $(y^2 - 2xy)dx = (x^2 - 2xy)dy$.	(05)
	c)	Solve $\frac{dy}{dx} + y\cot x = 4x\,cosec\,x, \quad y\left(\frac{\pi}{2}\right) = 0$.	(04)

OR

Q-6	a)	Solve $x^2\frac{dy}{dx} + y^2 = xy$.	(05)
	b)	Solve $3e^x \tan y\,dx + (1 - e^x)\sec^2 y\,dy = 0$.	(05)
	c)	Solve $\frac{dy}{dx} + x\sin 2y = x^3 cos^2 y$.	(04)

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