

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
Examination: Remedial

Time:10:30 To 1:30

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

- Q-2 a) State and prove Leibnitz's theorem. (05)
- b) Evaluate $\lim_{x \rightarrow 0} \left(\frac{1}{\sin^2 x} - \frac{1}{x^2} \right)$. (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 $\lim_{x \rightarrow 0} \frac{(\tan x - x)}{x^3}$. (04)

- Q-3 a) In usual notation prove that polar equation of circle is $r^2 + r_1^2 - 2rr_1 \cos(\theta - \theta_1) = a^2$. (05)
- 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 $A^2 = 5A + kI_2$, find $k \in R$. (04)



SECTION-II

- Q-4
- Define diagonal matrix. (01)
 - Define hermitian matrix. (01)
 - Define general solution of a differential Equation. (01)
 - Find order and degree of $\left(\frac{dy}{dx}\right)^3 + 2 \sin x \frac{dy}{dx} + xy = \frac{x^3}{dx}$. (01)
 - Is the matrix $A = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ in reduced row echelon form? (01)
 - Solve $2x dx + 2y dy = 0$. (01)
 - Is the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 3 \\ 1 & 0 & 8 \end{bmatrix}$ invertible? (01)

- Q-5
- Solve the system $x + 2y - z = 5, 3x - y + 3z = 7, 4x - 2y + 4z = 12$. (05)
 - Find inverse of the matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$. (05)
 - 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
- Find inverse by Gauss Jordan Method, for $A = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 1 & 0 \end{bmatrix}$. (05)
 - 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)
 - 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
- Solve $x(y^2 - 1)dx = y(1 + x^2)dy$. (05)
 - Solve $(y^2 - 2xy)dx = (x^2 - 2xy)dy$. (05)
 - Solve $\frac{dy}{dx} + y \cot x = 4x \operatorname{cosec} x, y\left(\frac{\pi}{2}\right) = 0$. (04)

OR

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

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