Date: 02/12/2013

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C.U.SHAH UNIVERSITY

WADHWAN CITY

University (Winter) Examination -2013

Course Name: B.ScSemester-I Subject Name: -Mathematics -I

Duration :- 2:30 Hours

Instructions:-

Q2

Q2

- (1) Attempt all Questions of both sections in same answer book / Supplementary.
- (2) Use of Programmable calculator & any other electronic instrument is 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

b) If
$$y = e^{x}$$
, then $y_{16} =$ _____.

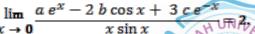
c) Center of the sphere
$$x^2 + y^2 + z^2 - 6x + 8y - 10z + 1 = 0$$
 is _____.

d) If
$$y = \cos(ax + b)$$
, then find y_n .

e) Transform
$$\theta = 30^{\circ}$$
 in Cartesian form.

Prove that
$$x \to 0$$

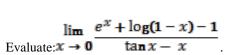
$$\frac{\lim_{x \to 0} \frac{(1+x)^n - 1}{x} = n.$$



- Find a, b, c so that $x \to 0$

State and prove Leibnitz's theorem.

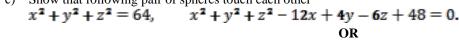
Find the Maclaurin's expansion $f(x) = \sin x$.



- Let $y = (x^2 2)^m$. Find the value of m such that $(x^2-2)y_{n+2}+2 \times y_{n+1}-n(n+1)y_n=0.$
- c) Find y_n for $y = e^{2x} \cos x \sin 2x$.
- O3 a) State and prove Lagrange's mean value theorem.
 - b) If any straight line through the pole meets the circle

$$r^2 - 2rdcos(\theta - \alpha) + d^2 - \alpha^2 = 0$$
 at point P and Q . Then prove that $OP \cdot OQ = d^2 - \alpha^2$.

c) Show that following pair of spheres touch each other



- Q3 a) Let two spheres be given by $S_1 = x^2 + y^2 + z^2 + 2u_1x + 2v_1y + 2w_1z + d_1 = 0, S_2 = x^2 + y^2 + z^2 + 2u_2x + 2v_2y + 2w_2z + d_2 = 0$ Then prove that $S_1 + \lambda S_2 = 0$, where $\lambda \in R$, $\lambda \neq -1$, represents a family of spheres passing through the intersection of the spheres $S_1 = 0$ and $S_2 = 0$.
 - b) In usual notation prove that polar equation of circle is $r^2 + r_1^2 - 2rr_1 \cos(\theta - \theta_1) = a^2$.
 - c) Verify the Roll's theorem for the function $f(x) = x^2 - 2x + 3, x \in [0,$

SECTION-II

What is the order and degree of $\left(\frac{dy}{dx}\right)^2 + 2\frac{dy}{dx} + xy = x^2$. 2 04 Define symmetric matrix. 1 Define scalar matrix. Is the matrix $A = \begin{bmatrix} \mathbf{1} & \mathbf{0} \\ \mathbf{0} & \mathbf{1} \end{bmatrix}$ in reduced row echelon form? Is the matrix $A = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ in reduced row echelon form? 1 Solve $x dx - y^2 dy = 0$. 1 $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 3 \\ 1 & 0 & 8 \end{bmatrix}$ 5 Q5 Find inverse of the matrix Solve the system 3x + 2y - z = 4, x + 6y + 3z = 22, 2x - 4y = -6 $A = \begin{bmatrix} 1 & 1 & 1 \\ -1 & 1 & -1 \\ 1 & 1 & 5 \\ 1 & 0 & 5 \end{bmatrix}$ 4 Find rank of the matrix $A = \begin{bmatrix} 3 & 4 & 5 & 6 \\ 4 & 5 & 6 & 7 \\ 5 & 6 & 7 & 8 \\ 11 & 12 & 13 & 04 \end{bmatrix}$ 5 Q5 Find normal form of the matrix 5 b) Find inverse by Gauss Jordan Method, for Solve the system by Gauss Jordan method 5x + y + 3z = 0. 3x-y-z=0,x + y + 2z = 0 $A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 2 \end{bmatrix}.$ 6 Q6 a) Find eigen values and eigen vectors of Solve: $x^2y dx - (x^3 + y^3)dy = 0$. Solve: $\frac{dy}{dx} + y \cot x = 4x \csc x$ $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & 1 & -1 \end{bmatrix}.$ 6 Q6 Verify Cayley Hamilton theorem for Solve: $\frac{dy}{dx} = \frac{y}{x} + \tan\left(\frac{y}{x}\right)$

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Solve: (p + y + x)(p + 2x) = 0, where $p = \frac{dy}{dx}$