

(Following Paper ID and Roll No. to be filled in your
Answer Books)

Paper ID : 214219

Roll No.

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M.C.A.

Theory Examination (Semester-II) 2015-16

**COMPUTER BASED NUMERICAL &
STATISTICAL TECHNIQUES***Time : 3 Hours**Max. Marks : 100***Note : Attempt questions from all Sections as per directions.****Section-A****Attempt all parts of this section. Answer in brief.****(2×10=20)**

- Q1. (a) Round off the numbers **865250** and **37.46235** to four significant figures and compute E_a , E_r and E_p .
- (b) Associative and distributive laws are not always valid in case of normalized floating point representation. Give example to prove this statement.
- (c) Express $1+x-x_2+x_3$ as sum of Chebyshev polynomials.

(1)

P.T.O.

- (d) Find the number of terms of the exponential series such that their sum gives the value of e^x correct to six decimal places at $x=1$.
- (e) Prove the Taylor's series for a function of one variable.
- (f) Write any four advantages of statistical quality control.
- (g) Prove the following identities:
- (i) $E = 1 + \Delta$
 - (ii) $\delta = E^{1/2} - E^{-1/2}$
- (h) The order of the $u_{j+1} = u_j + 1/2 (K_1 + K_2)$ by Runge-Kuttamethod is
- (i) one
 - (ii) two
 - (iii) three
 - (iv) four
- (i) Prove the formul a for fitting a straight line.
- (j) Explain Hypothesis and its type.

Section-B

Q2. Attempt any five questions from this section.

(10×5=50)

- a) Obtain the rate of convergence for Secant method and Newton-Raphson method. Hence find out which method converges more faster.
- b) By the method of least squares, find the curve $y=ax + bx^2$ that best fits the following data:

x	1	2	3	4	5
y	1.8	5.1	8.9	14.1	19.8

- c) Apply Gauss's Forward formula to find the value of $f(x)$ at $x=3.75$ from the table:

x:	2.5	3.0	3.5	4.0	4.5	5.0
t(x)	24.145	22.043	20.225	18.644	17.262	16.047

- d) Solve the equation $dy/dx = x+y$ with initial condition $y(0) = 1$ by Runge-Kutta rule from $x=0$ to $x=0.4$ with $h=0.1$.
- e) The population of a town was as given. Estimate the population for the year 1925.

Year (x)	1891	1901	1911	1921	1931
Population(y)	46	66	81	93	101

(3)

P.T.O.

- f) What is time-series analysis? Explain the objectives of analysis of a time series. Why is time-series analysis important in technology?
- g) Prove that regression coefficients are independent of origin but not to scale.
- h) Value of $f(x)$ for values of x are given as : $f(1) = 4, f(2) = 5, f(7) = 5, f(8) = 4$. Find $f(6)$ and also the value of x for which $f(x)$ is maximum or minimum using Lagrange's formula.

Section-C

Attempt any two questions from this section. (15×2=30)

Q3. Show that: $f[(a+b)/2] = [f(a)+f(b)]/2 + [(b-a)[f'(a)-f'(b)]]/8$ by Hermite's interpolation.

Q4. Find the cubic spline corresponding to the interval [2,3] from the following table:

x:	1	2	3	4	5
y:	30	15	32	18	25

Hence compute $y(2.5)$ and $y'(3)$.

- Q5. (i) Find the root of the equation $\tan x + \tanh x = 0$ which lies in the interval (1.6, 3.0) correct to four significant digits using method of false position.
- (ii) Explain CHI-SQUARE test and write the Yates's correction for test of independence.