

MCA (Revised)
Term-End Examination 07337
June, 2012

**MCSE-004 : NUMERICAL AND STATISTICAL
COMPUTING**

Time : 3 hours

Maximum Marks : 100

Note : Question No. 1 is compulsory. Attempt any three questions from the rest. Use of calculator is allowed.

1. (a) If 0.333 is the approximate value of $1/3$, find absolute, relative and percentage error. 3
- (b) Determine the number of iterations required to obtain the smallest positive root of $x^3 - 2x - 5 = 0$ correct upto two decimal places. 5
- (c) Solve $x + 2y + z = 3$ 5
- $2x + 3y + 3z = 10$
- $3x - y + 2z = 13$
- by Gauss Elimination Method.
- (d) Find the value of $\Delta \tan^{-1} x$, the interval of differencing being h . 2

- (e) A table of x Vs. $f(x)$ is given below. Find the value of $f(x)$ at $x=4$, use Lagrange Interpolation formula. 5

$x \rightarrow 1.5$	3	6
$f(x) \rightarrow -0.25$	2	20

- (f) Find the value of $\int_0^{0.6} e^x dx$, taking $n=6$, correct to five significant figures using Simpson's $\frac{1}{3}$ rule. 5
- (g) An individual's IQ score has a Normal distribution $N(100, 15^2)$. Find the probability that an individual IQ score is between 91 and 121. 5
- (h) Following data is given for marks in subject A and B of a certain examination. 7

	Subject A	Subject B
Mean Marks	36	85
Standard Deviation	11	8

Coefficient of correlation between A and B = ± 0.66

- (i) Determine the two equations of regression.
- (ii) Calculate the expected marks in A corresponding to 75 marks obtained in B.
- (i) Write the probability distribution formula for Binomial distribution, Poisson distribution and Normal distribution. 3

2. (a) Find an approximate value of the root of the equation $x^3 + x - 1 = 0$, near $x = 1$. Using the method of Regula-Falsi, twice. 5
- (b) Solve following system of equations by using Gauss - seidel iteration method, perform two iterations 6
- $$8x - 3y + 2z = 20$$
- $$6x + 3y + 12z = 35$$
- $$4x + 11y - z = 33$$
- (c) Solve the following system of equations by using LU decomposition method 6
- $$x + y = 2 ; 2x + 3y = 5$$
- (d) For $x = 0.5555 \text{ E1}$; $y = 0.4545 \text{ E1}$ and $z = 0.4535 \text{ E1}$, prove that $x(y - z) \neq xy - xz$ 3
3. (a) A polynomial passes through the points (1, -1), (2, -1), (3, 1) and (4, 5). Find the polynomial using Newton's forward interpolation formula. 5
- (b) Calculate the value of the integral 5
- $$\int_4^{5.2} \log x \, dx$$
- by using : (i) Simpson's $\frac{3}{8}$ rule
(ii) Simpson's $\frac{1}{3}$ rule
- (c) Using Runge Kutta method find $y(0.2)$ for 10
- the equation $\frac{dy}{dx} = \frac{y-x}{y+x}$; $y(0) = 1$. Take $h = 0.2$.

4. (a) The tangent of the angle between the lines of regression y on x and x on y is 0.6 and $\sigma_x = \frac{1}{2} \sigma_y$. Find r_{xy} . 5
- (b) Compute R and R^2 for the data given below : 5

Sample Size (i)	12	21	15	1	24
x_i	0.96	1.28	1.65	1.84	2.35
y_i	138	160	178	190	210
\hat{y}_i	138				
\hat{e}_i	0				

regression equation $y = 90 + 50x$ is used to fill the table where $\hat{e} = y_i - \hat{y}_i$.

- (c) If a bank receives on an average $\lambda = 6$ bad cheques per day. What is the probability that it will receive 4 bad cheques on any given day ? 5
- (d) What do you mean by term "Goodness to fit test" ? What for the said test is required? 5
5. (a) Solve the following system of equations by Jacobi Method, determine the results for three approximations. 7
- $$3x + 4y + 15z = 54.8$$
- $$x + 12y + 3z = 39.66$$
- $$10x + y - 2z = 7.74$$

- (b) Evaluate the integral $I = \int_0^1 \frac{dx}{1+x}$ by using composite trapezoidal rule with 2 and 4 subintervals. 8
- (c) A book contains 100 misprints distributed randomly throughout its 100 pages. What is the probability that a page observed at random contains atleast two misprints. 5
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