C 6877

Name

Reg. No..............................

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, JUNE 2010

Computer Science

CS 205 D—NUMERICAL AND STATISTICAL METHODS

(2005 admissions)

Time : Three Hours

Maximum : 80 marks

Part A

Answer any five *of the following.*
Each question carries 8 *marks.*

1. Discuss conditioning and stability of equations. Also discuss range reduction technique with an example of its application.

2. What is curve fitting ? Differentiate between interpolation and regression.

3. Discuss the Simpson's $1/3^{rd}$ rule of computing integrals by deriving the formula.

4. What are multistep methods ? Discuss the merits and demerits of multistep methods.

5. (a) In an experiment of your choice, identify two mutually exclusive and *two* independent events and verify the respective Laws of Probability.

   (b) Three factories A, **B,** C produce 1000, 4000 and 5000 parts respectively of which 20, 40, 50 are defective. All parts are put in one stock pile. One is selected at random and found to be defective. What is the probability that it is from A ?

6. Max Z = 3x + 2y + 4z such that 2x + y + z S 2, 3x + 4y + 2z 8 , x, y, z 0 using Simplex method.

7. Using Dual Simplex method, solve the problem given below :

   $\text{Min Z} = 3x + 2y$ such that $3x + y \geq 3, 4x + 3y \geq 6, x + y \leq 3$ and $x, y \geq 0$.

   (5 x 8 = 40 marks)

Part B

Answer any **four** *of the following.*
Each question carries 10 *marks.*

8. Solve the equations using complete pivotization technique :

$$2x_1 + 2x_2 + x_3 = 6$$
$$4x_1 + 2x_2 + 3x_3 = 4$$
$$x_1 + x2 \quad x_3 = 0$$

Turn over

9. Derive Lagrange's interpolation formula for divided differences and hence obtain a cubic polynomial for the data points given below :

x :	−1	0	1	3
y :	−6	−2	2	10

10. Use Milne's method to solve for y at x = 0.8 and 1.0 using the given data :

x:	0	0.2	0.4	0.6
	0	0.2027	0.4228	0.6841

for the equation $dy/dx = 1 + y^2$ with y(0) = 0.

11. (a) An expert hits a target 95% of the time. What is the probability that the expert will miss the target for the first time on the 15th shot ?

(b) The number of gamma rays emitted / sec. by a certain radioactive substance is Poisson with = 5.8. If a recording instrument becomes inoperative when there are more than 12 rays/sec., what is the probability that this instrument becomes inoperative during any given second and any two second interval ?

12. (a) A random variable has a p.d.f. $f(x) = kx^2$ in (0,3) and 0 otherwise. Find k, P (1 < x < 2) and distribution function of x.

(b) Assume the mean height of the soldiers to be 68.22 inches with a variance of 10.8 inches and the distribution to be normal. How many soldiers in a regiment of 2000 would you expect to be at least 6 feet tall ?

13. Find the optimal solution of the following transportation problem : —

		1	2	3	4	Availability
Plant	1	19	30	50	10	7
	2	70	30	40	60	9
	3	40	8	70	20	18
Requirements		5	8	7	14	

(4 x 10 = 40 marks)