C 48354 (Pages 3) Name..................................

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

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, AUGUST 2008

Computer Science (Elective)

CS 205 D—NUMERICAL AND STATISTICAL METHODS

(2005 Admission onwards)

Time : Three Hours Maximum : 80 Marks

Part A

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

1. Explain the different errors which one comes across while doing computations using numerical methods with an example for each.
2. Discuss Direct and Indirect methods. Hence develop a computational model for the Secant method.
3. Discuss the pivotization process with an example.
4. Derive Milne's Predictor - corrector formula for finding the solution to a given differential equation.
5. (a) Show that P (A n B) P (A) < P (A v B) for any two events A and B. (3 marks)

   (b) State Bayes theorem. Three factories A, B, C produce 100, 400, 500 parts of which 2, 4, 5 are defective. All the 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 C ?

   (5 marks)
6. (a) Given that the switch of a consultant's office receives on the average 0.5 calls/min. Find the probabilities that :

   (i) in a given min., there will be atleast one call.

   (ii) in a 5 min. interval, there will be almost 3 calls.

   (4 marks)

   (b) A random variable X has a probability function :

$$f(x) = \begin{cases} 0 & \text{if } x < 1 \\ k(x-1)^4 & \text{if } 1 < x < 3 \\ 1 & \text{if } x > 3. \end{cases}$$

   Find :

   (i) k.

   (ii) the p.d.f. of $f(x)$.

   (4 marks)

Turn over

7. Draw sketches to show degenerate, multi-optimal solutions in an LPP.

(5 x 8 = 40 marks)

Part B

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

8. Use appropriate formula to find the value of Y at X = 2.75 and X = 14.75 for the data given below :

X ...	2	4	6	8	10	12	14	16
Y ...	10	16	21	26	29	37	39	46

9. Derive Simpson's 3/8th rule formula and hence solve the integral :

$$\int_1^2 \frac{e^x}{x}\,dx \text{ with } h = 0.5.$$

10. Solve the following equations by Gauss Jacobi method correct to 3 decimal places :

$$2x + 2y + z = 6$$
$$4x + 2y + 3z = 4$$
$$x + y + z = 0$$

11. When is an LPP unbounded ? What can you say about its dual ? Verify your statement in the following problem :

Maximize $Z = 1.5x + 2y$

such that $4x + 4y > 16$

$2.5x + 4y > 10$

$x, y > 0.$

12. In the following transportation problem, find the initial basic feasible solution using any method and later find the optimal solution :

Sources	Destination			Supply
	1	2	3	
1	5	1	7	30
2	6	4	6	80
3	3	2	5	35
Demands	75	20	50	

13. (a) A lot of IC chips contain 1% defective. Each is tested before delivery. Tester is not totally reliable. P (Tester says Good/Chip is good) = 0.95. P (Tester says bad/Chip is bad) = 0.94. If a tested device is defective, find the probability that it is so ?

(4 marks)

(b) A machine produces bolts which are 10% defective. Find the probability that in a random sample of 400 bolts produced by this machine :

(i) Atleast 30 ;

(ii) Between 30 to 50 ;

will be defective. Use Poisson and Normal distribution for computation.

(6 marks)

[4 x 10 = 40 marks]