M.C.A. DEGREE EXAMINATIONS: APRIL 2010

Fourth Semester

P07CAE01: NUMERICAL AND STATISTICAL METHODS

Time: Three Hours   **Maximum Marks: 100**

Answer ALL the Questions:-

PART A (10 x 2 = 20 Marks)

1. What is the condition for the convergence of Gauss-Seidel method?

2. What is the difference between Gauss-elimination method and Gauss-Jordan method?

3. What is the drawback in using Lagrange's interpolation formula?

4. To apply Simpson's 1/3 rule, what is the condition on number of ordinates?

5. What is the disadvantage in Taylor series method?

6. Runge Kutta method is a single step method. Why?

7. State the axioms of Probability.

8. Write any two properties of moment generating function.

9. Define Type I and Type II errors.

10. What is the test statistic used to test the significance of the difference between the means of two small samples?

PART B (5 x 16 = 80 Marks)

11. (a). Solve the system of equations,

$$x + 3y + 10z = 24$$
$$2x + 3y + 10z = 35$$
$$28x + 4y - z = 32 \quad \text{by}$$

    (i)   Gauss- Elimination method   (8)

    (ii)   Gauss-Jordan method.   (8)

(OR)

(b). Solve the system of equations, correct to four decimal places,

$$27x + 6y - z = 85$$
$$6x + 15y + 2z = 72$$
$$x + y + 54z = 110 \quad \text{by}$$

    (i)   Gauss Jacobi method   (8)

    (ii)   Gauss-Seidel method.   (8)

12. (a). Using Newton's interpolation formulae, find the values of f(22) and f(42) from the following

available data:

x	20	25	30	35	40	45
f(x)	354	332	291	260	231	204

(OR)

(b) (i). Using Lagrange's formula to find x corresponding to y=85 given

x	2	5	8	14
y	94.8	87.9	81.3	68.7

(8)

(ii). Evaluate $\int_0^b \frac{dx}{1+x^2}$ by using Simpson's rule and also by actual integration. (8)

13. (a) Apply the fourth order Runge-Kutta method, to find an approximate value of y when x=0.2,

given that $\frac{dy}{dx} = x + y, \ y(0) = 1$

(OR)

(b) Using Milne's predictor corrector method find y(2) if y(x) is the solution of $\frac{dy}{dx} = \frac{1}{2}(x+y)$

y(0)=2, y(0.5)=2.636, y(1.0)=3.595 and y(1.5)=4.968.

14. (a) (i) The probability that the student passes a certain exam is 0.9, given that he studied. The

probability that he passes the exam without studying is 0.2. Assume that the probability that

he studies for the exam is .75. Given that the student passed the exam, what is the probability

that he studied? (8)

(ii) Find the moment generating function of the random variable 'X' having the probability

density function $f(x) = \begin{cases} x, & for \quad 0 < x < 1 \\ 2-x, & for \quad 1 < x < 2 \\ 0 & otherwise \end{cases}$ (8)

(OR)

(b) Two random variables X and Y have the joint probability density function

$$f(x, y) = \begin{cases} Ae^{-(x+y)}, & x+y \geq 0 \\ 0 & otherwise \end{cases}$$

(i)   Find A

(ii)   Find the marginal probability density function.

(iii) Find the joint cumulative distribution function.

(iv) Evaluate $P\{0 < X < 1; 1 < Y < 2\}$ (v) Are X and Y independent?

15. (a). From the following two sample values, find out whether they have come from the same normal population.

Sample-I	17	27	18	25	27	29	27	23	17
Sample-II	16	16	20	16	20	17	15	21	-

(OR)

(b). Perform the analysis of variance for the five different cultivation treatments A, B, C, D, E.

A 48	E 66	D56	C52	B61
D64	B62	A50	E64	C63
B69	A53	C60	D61	E67
C57	D58	E67	B65	A55
E67	C57	B66	A60	D57

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