Register Number: …….

M.E DEGREE EXAMINATIONS: JANUARY 2011

First Semester

CAD/CAM

MAT503: Applied Mathematics

Time: Three hours **Maximum Marks: 100**

Answer ALL Questions

PART A (10 x 2 = 20 Marks)

1. Define linear transformation.
2. Write down the matrices of identity and zero transformations.
3. State the K-T conditions for maximization NLPP.
4. What is meant by quadratic programming?
5. What do you mean by Bezier curves?
6. Define cubic spline polynomial
7. What are the principles of experimental design?
8. Compare RBD and LSD.
9. Define Fuzzy relation.
10. What is neural network?

PART B (5 x 16 = 80 Marks)

11. a) (i) Show that the mapping T: $R^3 \rightarrow R^3$ defined by T (a,b,c) = (a–b+2c , 2a+b,–a–2b+2c) is a linear transformation. Find the null space N(T). (10)

(ii) Find the matrix of the linear transformation T on R^2 defined by T(a,b)= (2a–3b, a+b) with respect to the basis B={(1,0),(0,1)}. (6)

(OR)

b) (i) If the matrix of a linear transformation T on R^2 relative to the basis B = {(1,0),(0,1)} is $\begin{bmatrix} 2 & -3 \\ 1 & 1 \end{bmatrix}$, find T(a,b). (8)

(ii) A linear transformation T on R^3 is defined by T (a,b,c) = (a+3b+c, –a+2c,4c). Find the matrix of the inverse transformation T^{-1}. (8)

12. a) Solve the non-linear programming problem: Minimize

$Z=2x_1^2-24x_1+2x_2^2-8x_2+2x_3^2-12x_3+200$ subject to the constraint $x_1+x_2+x_3=11$.

(OR)

b) Use the Kuhn-Tucker conditions to solve the NLPP: Minimize $f(x) = (x_1+1)^2 + (x_2-2)^2$ subject to the constraints $0\le x_1\le 2$ and $0\le x_2\le 1$.

13. a) Obtain the cubic spline approximation for the function $y = f(x)$ from the following data assuming $y''(-1) = 0$ and $y''(2) = 0$

x	: −1	0	1	2
y	: −1	1	3	35

(OR)

b) Using Hermite's interpolation, compute f(0.5) and f(1.5) from the following data

x	0	1	2
f(x)	0	4	0
f′(x)	0	0	0

14. a) A company appoints four salesmen A, B, C and D and observes their sales in three seasons. The figures (in lakhs of rupees) are given in the following table

Carry out two way analysis of variance.

Season	Salesmen			
	A	B	C	D
Summer	45	40	38	37
Winter	43	41	45	38
Monsoon	39	39	41	41

(OR)

b) Analysis the variance in the Latin square of yields (in quintals) of wheat where

P, Q, R, S represent the different manures used.

S222	P221	R223	Q222
Q224	R223	P222	S225
P220	Q219	S220	R221
R222	S223	Q221	P222

Test whether the different manures used have given significantly different yields.

15. a) (i) Discuss the operations on Fuzzy relations . (10)

(ii) Consider the following two fuzzy sets A= $\left\{\frac{0.3}{x_1}+\frac{0.7}{x_2}+\frac{1}{x_3}\right\}$ and B = $\left\{\frac{0.4}{y_1}+\frac{0.9}{y_2}\right\}$.

Obtain the Fuzzy relation R= A×B (6)

(OR)

b) (i) Discuss the advantages of Neural Networks. (8)

(ii) What are Genetic algorithms? List out the basic operators in Genetic algorithms. (8)

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