01/12/15

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15-17

End Semester Examinations Dec., 2015

Course Name: M.Sc. Applied Statistics, Semester- I

Course Code: MAS 101

Course Title: Advance Analysis and Linear Algebra

Time Allowed: 3 Hours | Total Marks: 100

Note: -

1. Attempt any FIVE questions.
2. Question No. 1 is compulsory.
3. All questions carry equal marks.

Q 1. Write short notes on any two of the following:

i. Cauchy Integral Theorem

ii. Cayley-Hamilton Theorem

iii. Continuity of a function

iv. Open and Closed Intervals

Q 2. Define vector and vector space. Explain the addition and scalar multiplication of vectors. Explain the linear dependence of vectors. Show that the vectors (2, 3,-1,-1) , (1,-1,-2,-4) , (6, 3 , 0,-7) , (6,3,0,-7) form a linearly dependent system.

Q 3. Define characteristic roots and characteristic vectors of a square matrix. Find the characteristic roots of the following matrix

$$A = \begin{matrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 3 & 5 & 7 \end{matrix}$$

Q 4. Prove that every continuous function is integrable .Show that the function [X], where [X] denotes the greatest integer not greater than X, is integrable in [0,3] and $\int_0^3 [X]dx = 3$.

Q 5. State and prove necessary and sufficient conditions for analytic function. Determine which of the following functions are analytic?

i. $2xy + 2(x^2 - y^2)$

ii. $(x - 2y)/ x^2 + yz$

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Q 6. Define rank and inverse of a matrix. Show that the rank of the product of two matrices that cannot exceed the rank of either matrix and the rank of the sum of two matrices is almost equal to the sum of the rank of the two matrices.

Q 7. State and prove that the necessary and sufficient condition for a real quadratic from to be a positive definite. Prove that each of the quadratic forms

i. $6x^2 + 35y^2 + 11z^2 + 34yz$

ii. $6x^2 + 49y^2 - 51z^2 - 82yz + 20zx - 4xy$

Is a positive definite.

Q 8. Define basis and dimension of a subspace. Prove that the number of vectors in any basis of a vector space is unique. If A and B be the two matrices of the same type then show that:

$$P(A+B) \leq P(A) + P(B).$$

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