AJEENKYA
D Y PATIL UNIVERSITY

End Term Examinations (December 2018)

School: School of Information Technology **Program: BTECH (MACT/CTIS/DS)**

Course: Linear Algebra & Differential Calculus **Course Code**: ENG 101

Semester: I **Max Marks:** 50 **Duration (mins):** 90

Section A

Q1 Fill in the Blanks. (Any Five) **10 Marks**

a) The Polar form representation of complex Number is………

b) The system of Equation is said to be Inconsistence if …………

c) The vectors X_1, X_2, X_3, ….. X_n are said to be Linearly Independent…….

d) To find rank of matrix by Normal form means convert given Matrix in to……

e) The Implicit function $\frac{dy}{dx} =$ …………….

f) $\frac{\partial(x, y)}{\partial(u, v)} =$ ……………..

Section B

Q2. Answer the following (Any Four) **20 Marks**

a) Expand the series expansion for e^{e^x}

b) Convert the following matrix in to Echelon form $\begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}$

c) Evaluate $\lim_{x \to 1}\left(\frac{x}{x-1} - \frac{1}{\log x}\right)$

d) By using De-Moivre's theorem Find all values of $(-1)^{1/6}$

e) If $\boldsymbol{u = (1 - 2xy + y^2)^{-1/2}}$ ***then prove that*** $\boldsymbol{x\frac{\partial u}{\partial x} - y\frac{\partial u}{\partial y} = u^3y^2}$

f) Investigate the value of $\boldsymbol{\mu}$ ***and*** $\boldsymbol{\lambda}$ so that the linear system

$\boldsymbol{x + y + 2z = 6\,; x + 2y + 4z = 10\,; x + 4y + yz = \mu}$ has

1) no solution 2) unique solution 3) infinite many solutions.

Section C

Q3. Answer the following (Any Two) **20 Marks**

a) If $\boldsymbol{x = u + v + w}$; $\boldsymbol{y = uv + vw + wu}$; $\boldsymbol{z = uvw}$ and $\emptyset$ is a function of $\boldsymbol{x, y, z}$ then prove that; $\boldsymbol{u\frac{\partial \emptyset}{\partial u} + v\frac{\partial \emptyset}{\partial v} + w\frac{\partial \emptyset}{\partial z} = x\frac{\partial \emptyset}{\partial x} + 2y\frac{\partial \emptyset}{\partial y} + 3z\frac{\partial \emptyset}{\partial z}}$

b) Solve the system of Linear Equation;

$\boldsymbol{2x + y - z + 3w = 8;\ x + y + z - w = -2;\ 3x + 2y - z = 6;\ 4y + 3z + 2w = -8}$

c) If $\frac{Z+i}{Z+2}$ is purely imaginary. Show that the locus of (x , y) is a circle of radius $\frac{\sqrt{5}}{2}$.

d) Verify Cayley-Hamilton Theorem and hence find A^{-1} for the Matrix

A= $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ Also find A^4

e) Find non-singular matrices P and Q such that PAQ is in normal form where ,

A = $\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$

$$\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$

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