INDIAN INSTITUTE OF INFORMATION TECHNOLOGY UNA [HP]

An Institute of National Importance under MoE

Saloh, Una (HP) – 177 209

Website: www.iiitu.ac.in

AY 2021-22

School of Computing

CURRICULUM: IIITUGCSE20

Cycle Test – I

14-02-2022

Degree	B. Tech.	**Branch**	CSE
Semester	I		
Subject Code & Name	MAC111: Engineering Mathematics		
Time: 60 Minutes	**Answer All Questions**		**Maximum: 20 Marks**

Sl. No.	**Question**	**Marks**
1.a	Interpret all non-trivial solutions of the following equations $x_1 - 2x_2 + 3x_3 = 0,\quad 2x_1 + 5x_2 + 6x_3 = 0$	(1)
1.b	Find the inverse of the matrix $A = \begin{pmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{pmatrix}$ using Gauss-Jordan method.	(2)
1.c	Express $A^5 - 4A^4 - 7A^3 + 11A^2 - A - 10I$ as linear polynomial in A, where $A = \begin{pmatrix} 1 & 4 \\ 2 & 3 \end{pmatrix}$	(2)
2.a	Show that the eigen values of an orthogonal matrix has absolute value 1.	(1)
2.b	If $A = \begin{bmatrix} -1 & 2+i & 5-3i \\ 2-i & 7 & 5i \\ 5+3i & -5i & 2 \end{bmatrix}$, show that A is Hermitian matrix and 'iA' is skew Hermitian matrix	(2)
2.c	Find an orthogonal matrix for the quadratic form $7x^2 + 10y^2 + 7z^2 - 4xy + 2xz - 4yz$	(2)

3.a	Test for the convergence of the series $\sum_{n=1}^{\infty} \frac{n!}{n^n}$	(1)
3.b	Examine the convergence of the series $\sum_{n=2}^{\infty} \frac{1}{n(\log n)^k}$	(2)
3.c	Examine the convergence of the series $1+\frac{1!}{2}x+\frac{2!}{3^2}x^2+\frac{3!}{4^3}x^3+....$	(2)
4.a	Test for the convergence of the series $\sum_{n=1}^{\infty} \sqrt{n^4+1}-\sqrt{n^4-1}$	(1)
4.b	Test for the convergence of the series $1+\frac{(1!)^2}{2!}x+\frac{(2!)^2}{4!}x^2+\frac{(3!)^2}{6!}x^3+....$	(2)
4.c	Examine the convergence of the series $\frac{(a+x)}{1!}+\frac{(a+2x)^2}{2!}+\frac{(a+3x)^3}{3!}+\ldots$	(2)