Table 12

Effect of repair rate of scanner machine and printing machine on steady state availability

$\mu_3 \rightarrow$ $\mu_4 \downarrow$	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5
0.1	0.85509	0.89329	0.91369	0.92639	0.93505	0.94134	0.94611	0.94585	0.95287
0.15	0.85754	0.89595	0.91648	0.92926	0.93797	0.9443	0.9491	0.95287	0.95591
0.2	0.85877	0.89729	0.91788	0.9307	0.93944	0.94579	0.9506	0.95439	0.95743
0.25	0.8595	0.8981	0.91873	0.93157	0.94033	0.94668	0.95151	0.9553	0.95835
0.3	0.86	0.89864	0.91929	0.93214	0.94092	0.94728	0.95211	0.95591	0.95896
0.35	0.86035	0.89902	0.91969	0.93256	0.94134	0.94771	0.95255	0.95634	0.9594
0.4	0.86061	0.89931	0.92	0.93287	0.94165	0.94803	0.95287	0.95667	0.95973
0.45	0.86082	0.89954	0.92023	0.93311	0.9419	0.94828	0.95312	0.95692	0.95998
0.5	0.86098	0.89972	0.92042	0.9333	0.9421	0.94848	0.95332	0.95713	0.96019

Table 13

Effect of repair rate of printing machine and binding machine on steady state availability

$\mu_4 \rightarrow$ $\mu_5 \downarrow$	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5
0.1	0.85509	0.85754	0.85877	0.8595	0.8597	0.86035	0.86061	0.86082	0.86098
0.15	0.85518	0.85763	0.85886	0.8596	0.86009	0.86044	0.8607	0.86091	0.86108
0.2	0.85523	0.85767	0.8589	0.85964	0.86013	0.86049	0.86075	0.86096	0.86112
0.25	0.85526	0.8577	0.85893	0.85967	0.86016	0.86051	0.86078	0.86098	0.86115
0.3	0.85527	0.85772	0.85895	0.85969	0.86018	0.86053	0.8608	0.861	0.86117
0.35	0.85529	0.85773	0.85896	0.8597	0.86019	0.86055	0.86081	0.86102	0.86118
0.4	0.8553	0.85774	0.85897	0.85971	0.8602	0.86055	0.86082	0.86103	0.86119
0.45	0.85531	0.85775	0.85898	0.85972	0.86021	0.86056	0.86083	0.86103	0.8612
0.5	0.85531	0.85776	0.85898	0.85972	0.86022	0.86057	0.86083	0.86104	0.8612

Table 14

Effect of failure and repair rate of scanner machine on steady state availability

$\lambda_3 \rightarrow$ $\mu_3 \downarrow$	0.01	0.015	0.02	0.025	0.03	0.035	0.04
0.01	0.495181	0.396910	0.331185	0.284134	0.248790	0.221265	0.199225
0.015	0.593074	0.495181	0.425026	0.372283	0.331185	0.298259	0.271285
0.02	0.658128	0.565143	0.495181	0.440633	0.396910	0.361081	0.331185
0.025	0.704492	0.617489	0.549613	0.495181	0.450560	0.413315	0.381758
0.03	0.739210	0.658128	0.593074	0.539725	0.495181	0.457430	0.425026
0.035	0.766180	0.690592	0.628579	0.576785	0.532877	0.495181	0.462466
0.04	0.787735	0.717122	0.658128	0.608102	0.565143	0.527854	0.495181

Effect of failure and repair rate of printing machine on steady state availability

$\lambda_4 \rightarrow$ $\mu_4 \downarrow$	0.01	0.015	0.02	0.025	0.03	0.035	0.04
0.01	0.46308	0.37602	0.31651	0.27326	0.24042	0.21462	0.19382
0.015	0.54761	0.46308	0.40116	0.35484	0.31651	0.2863	0.26136
0.02	0.60261	0.52371	0.46308	0.41503	0.37602	0.34371	0.31651
0.025	0.64125	0.56836	0.51034	0.46308	0.42383	0.39071	0.36239
0.03	0.66988	0.60261	0.54761	0.50181	0.46308	0.4299	0.40116
0.035	0.69196	0.62971	0.57774	0.53369	0.49588	0.46308	0.43435
0.04	0.70949	0.65169	0.60261	0.56039	0.52371	0.49153	0.46308

O abordare multidisciplinară pentru analiza disponibilității tranzitorii și stării staționare într-un sistem complex

Abstract: *This paper outlines a methodology for analyzing the availability of a complex system within the printing industry under both transient and steady-state conditions. The study utilizes a transition diagram to develop a mathematical model of the system. Differential equations governing the system are derived using the Markov approach. The matrix method is implemented in C+ programming to determine the availability of intricate systems with continuous failure and repair rates. The study investigates the impact of failure and repair rates on the long-term availability of various subsystems. Furthermore, this research adopts a multidisciplinary approach, integrating techniques from engineering, mathematics, computer science, data visualization, management, and broader system analysis.*
Key words: *Availability, differential equations, matrix method, mathematical model.*

Zeenat ZAIDI Department of Mathematics, College of Science, Qassim University, Buraidah 51452, Qassim, Kingdom of Saudi Arabia (Email: z.hasain@qu.edu.sa), Home Address: 2146, Al Faiziah, Al A Akhdar, Buraidah, Qassim, Saudi Arabia, 52391, Mobile no. +966 50393649